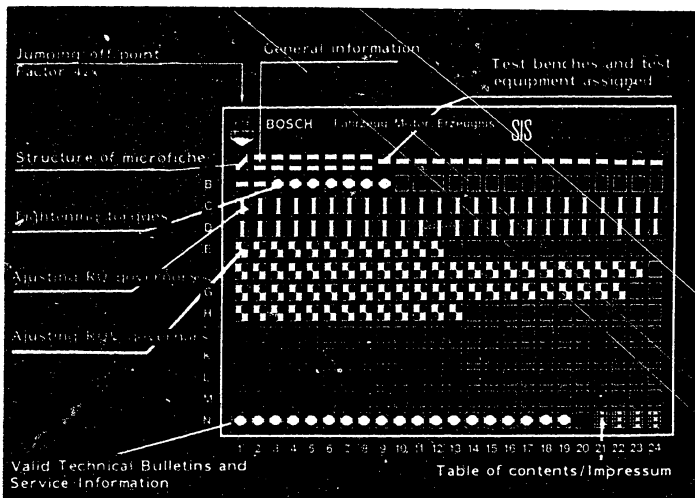


## Structure of microfiche



1. Read from left to right

2. Title of microfiche (appears on each coordinate)

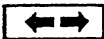
<b>E 16</b>	Product/assembly/test step	
	Vehicle/engine	

↑ Coordinate

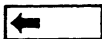
3. Limits of section



Beginning



Mid-section



End



One-page section

**A1**

Structure of microfiche

RQ/RQV governors



## 1. NOTES ON THE TESTING OF GOVERNORS

### 1.1 General notes

The test instructions contain all important instructions and information necessary for the adjustment of governors of series RQ and RQV for fuel-injection pumps of sizes A, MW and P.

The sequence in which the operations are described is the same as the sequence in which the test specifications are given. The stated fuel deliveries are always the average of all plunger-and-barrel assemblies of a pump. The specified difference between fuel deliveries applies to the individual plunger-and-barrel assemblies of a pump.

Specified control-rod travels are adjusted and measured with the appropriate control-rod-travel measuring device. Checking values for engine speeds, fuel deliveries and difference are given in parentheses. These values apply only to the injection-pump assembly as received and may under no circumstances be used for resetting the pump.

### 1.2 Test specifications

The test specifications for fuel-injection equipment are contained in the test specifications on microcards WP.. (table of contents WP-00).

The collected test specifications for governors and timing devices alone are listed on microcards WP-451 to WP-453.



### 1.3 Calibrating oil

The calibrating oil must conform to ISO standard 4113. It must not be mixed or contaminated with lubricating oil or diesel fuel from the fuel-injection pump since this will influence the measured values.

The admixture of other constituents might otherwise lead to the formation of an ignitable gas-air mixture and possibly to an explosion.

The specified calibrating oil temperature for in-line pumps is +38...+42°C in the inlet.

If using the continuous injected-quantity measuring system (KMM), the ambient temperature must not exceed +40°C.

#### Testing the viscosity:

Test equipment: ● Collector vessel with lid  
● Thermometer with protective KDEP 1500 tube and holder  
● Viscosity test beaker  
● Stopwatch (not included)

#### Inspection intervals (depending on frequency of use of test bench)

- 1 x per week (according to ISO standard 4008/III).
- no later than after testing 20 injection pumps or after approx. 35 hours of operation.
- after no later than 6 months if, in the meantime, no injection pumps or less than 20 have been tested.



### Preparations

Fill collector vessel approx.  $\frac{3}{4}$  full with filtered calibrating oil from the test bench inlet line. Ensure utmost cleanliness. Even minute particles of dirt (e.g. fluff in the collector vessel) will falsify the measurements.

Mount thermometer with protective tube on inside of vessel. Immerse viscosity test beaker in calibrating oil and leave in the calibrating oil for approx. 15 minutes. This ensures temperature equalization between viscosity test beaker and calibrating oil.

### Testing

Using the chain, pull viscosity test beaker briskly (within approx. 1 sec) out of the calibrating oil (do not swing, keep steady in order to prevent loss of contents).

Start stopwatch when the viscosity test beaker emerges from the calibrating oil.

When the calibrating oil from the funnel-shaped region of the test beaker enters inside into the test beaker bore, stop stopwatch, read off discharge time and note. Repeat viscosity test until identical measurement (tolerance  $\pm 0.3$  s) is obtained.

If an identical result has not been obtained after the 4th repeat, there is dirt (e.g. fluff) in the viscosity test beaker, the collector vessel or the calibrating oil (filter in test bench). See section on Preparations. After this, repeat the test again, as described.

Compare measurement result with values in table.

If the measured time is not within the allowable discharge time tolerance, change the calibrating oil and the calibrating oil filter in the pump test bench.



Oil temperature  
in °C

Allowable discharge time  
(sec)

10	82.0 ... 89.5
11	81.0 ... 88.5
12	80.5 ... 87.5
13	80.0 ... 86.5
14	79.0 ... 86.0
15	78.5 ... 85.0
16	78.0 ... 84.0
17	77.5 ... 83.0
18	77.0 ... 82.0
19	76.5 ... 81.5
20	75.5 ... 80.5
21	75.0 ... 79.5
22	74.5 ... 79.0
23	74.0 ... 78.0
24	73.5 ... 77.5
25	73.0 ... 77.0
26	72.5 ... 76.0
27	72.0 ... 75.5
28	71.5 ... 75.0
29	71.0 ... 74.5
30	70.5 ... 74.0

Continued on A6

**A5**

General notes  
RQ/RQV governors



(Continued)

Oil temperature  
in °C

Allowable discharge time  
(sec)

31	70.0 ... 73.5
32	69.5 ... 73.0
33	69.0 ... 72.5
34	68.5 ... 72.0
35	68.2 ... 71.5
36	67.8 ... 71.0
37	67.5 ... 70.5
38	67.0 ... 70.0
39	66.5 ... 69.5
40	66.0 ... 69.0

**A6**

General notes

RQ/RQV governors



### Cleaning the viscosity test beaker

Do not clean the inside of the viscosity test beaker by polishing, but after each test wash out with benzine in order to prevent resin deposits in the outlet bore.

Never clean the outlet bore with a needle since score marks in the bore would falsify the measurement result due to a change in the flow conditions.



#### 1.4 Test equipment and pump test bench

The setting and checking values given in the test specifications refer to precisely specified test equipment. The most important components of the test equipment are: calibrating nozzle-and-holder assembly and calibrating fuel-injection tubing.

Possible variants of such test equipment are listed in the following. The first-mentioned calibrating fuel-injection tubing and calibrating nozzle-and-holder assemblies represent the usual test equipment for the respective pump type. Different versions of test equipment are listed after.

The calibrating fuel-injection tubing and calibrating nozzle-and-holder assemblies which are to be used are strictly specified in the test specifications for each injection-pump assembly.

The test equipment also contains a list of the types of test bench which are approved for each size of pump. Failure to comply with these instructions will lead to serious setting errors on pumps and to incorrect test results.

Models of test bench which are not listed must not be used.

#### 1.5 Condition of test equipment

The injection pressure of the calibrating nozzle-and-holder assemblies and the condition of the nipples of the calibrating fuel-injection tubing (use limit gauge) should be checked once a week, and no later than after testing 20 injection pumps.

If necessary, re-adjust opening pressure of nozzle holders and repair/replace fuel-injection tubing.



# 1.6 Test benches and test equipment assigned to models of injection pump

Pump model: PE(S)..A.., PE(S)..AM..

Approved pump test benches	Specified				1 Inlet pressure
	cal.fuel-injection tubing	cal. nozzle-and-holder assemblies			2 Overflow valve/ Part No.
Model designation (no. of measuring points) Remarks, restrictions	1 Part No. 2 O.D. x wall thickness x length 3 Delivery-valve holder thread 4 Remarks	Model 1 Part No./ mod. desig. 2 Opening pressure	cal. nozzle 1 Part No./ mod. desig. 2 Type	perforated plate 1 Part No. 2 Bore dia.	3 Remarks
EFEP 375.. (8) *	1 1 680 750 014	1 0 681 343 009	1 0 681 443014	-----	1 1.0 bar (kp/cm <sup>2</sup> )
EFEP 385.. (12) *	2 6 x 2 x 600 mm	EF 8511/9 A	EFEP 182		1 417 413 000 or
EFEP 390.. (12) *	3 M 12 x 1.5	2 172 + 3 bar	2 S pintle nozzles		2 as given in test- specification sheet for pump
EFEP 410.. (12) *	4 possible deviations (given on test-speci- fication sheet):	(175 + 3kp/cm <sup>2</sup> )			3 Scavenging: with PE(S)..A..D.. and PE(S)..AM.. <u>D</u> .. all versions
ESP 270.. (8)	1 1 680 750 015				with all other PE(S)..A.. and PE(S)..AM.. as of 8 mm plunger- and-barrel assembly diameter
EFEP 500.. (8)	2 6 x 1.5 x 600 mm				
EFEP 515.. (12)	3 M 14 x 1.5				
EFEP 615.. (12)	1 1 680 750 008				
* with large flywheel	2 6 x 2 x 600 mm				
1 686 609 057 all injection- pump versions;	3 M 14 x 1.5				
	1 9 681 230 702				
	2 6 x 2 x 600				
	3 9/16" - 18				
	1 9 681 230 706				
	2 6 x 2 x 600 mm				
	3 9/16" - 18 (Ermeto)				

**A9**

General notes

RQ/RQV governors



**A10**

General notes

RQ/RQV governors



Test benches and test equipment assigned to models of injection pump (continued)

Pump model: PE(S)..P..(up to 11 mm plunger diameter)

Approved pump test benches	Specified				1 Inlet pressure
	cal.fuel-injection tubing	cal. nozzle-and-holder assemblies			2 Overflow valve/ Part No.
	1 Part No. 2 O.D. x wall thickness x length 3 Delivery-valve holder thread 4 Remarks	Model 1 Part No./ mod. desig. 2 Opening pressure	cal. nozzle 1 Part No./ mod. desig. 2 Type	perfor. plate 1 Part No. 2 Bore dia.	3 Remarks
EFEP 410.. (12) 1)	1 1 680 750 015	1 0 681 343 009	1 0 681 443014	-----	1 1.5 bar (kp/cm <sup>2</sup> )
EFEP 375.. (8) *	2 6 x 1.5 x 600 mm	EFEP 8511/ 9A	EFEP 182		2 1 417 413 025 or as given in test- specification sheet for pump
EFEP 385.. (12) *	3 M 14 x 1.5	2 172 + 3 bar (175+3kp/cm <sup>2</sup> )	2 S pintle nozzle		3 Scavenging
EFEP 390.. (12) *	4 Possible deviations (given on test-speci- fication sheet).				
EPS 270.. (8) 2)					
EFEP 500.. (8) 2)	1 9 681 230 724	1 1 688 901 016	1 0 688 901999	1 1 680 103 095	
EFEP 515.. (12)	2 6 x 1.5 x 750 mm	2 207 + 3 bar (211+3kp/cm <sup>2</sup> )		2 0.5 mm dia	
EFEP 615.. (12)	3 M 14 x 1.5				
*with large flywheel 1 686 609 057 all injection pump versions: 1) up to PE(S) 8P 110 .. with large flywheel 2) up to PE(S) 6P 110 ..					

**A11**

General notes

RQ/RQV governors



**A12**

General notes

RQ/RQV governors



Test benches and test equipment assigned to models of injection pump (continued)

Pump model: PE(S)..MW..

Approved pump test benches	Specified				1 Inlet pressure
	cal.fuel-injection tubing	cal. nozzle-and-holder assemblies			2 Overflow valve/ Part No.
Model designation (no. of measuring points remarks, restrictions)	1 Part No.	Model	cal. nozzle	perfor. plate	3 Remarks
	2 O.D. x wall thickness x length	1 Part No./ mod. desig.	1 Part No./ mod. desig.	1 Part No.	
	3 Delivery-valve holder thread	2 Opening pressure	2 Type	2 Bore dia.	
	4 Remarks				
EFEP 5.. (8) 1)	1 1 680 750 014	1 0 681 343 009	1 0 681 443014	-----	1 1.5 bar (kp/cm <sup>2</sup> )
EFEP 25.. (8) 1)	2 6 x 2 x 600 mm	EF 8511/9A	EFEP 182		2 1 417 413 000
EFEP 375.. (8) *	3 M 12 x 1.5	2 172 - 3 bar (175+3kp/cm <sup>2</sup> )	2 S pintle nozzle		or as given in test- specification sheet for pump.
EFEP 385.. (12) *	4 possible deviations (given on test-speci- fication sheet):				3 Scavenging
EFEP 390.. (12) *					
EFEP 410.. (12) *					
EPS 270.. (8)	1 1 680 750 014	1 1 688 901 016	1 1 688 901999	1 1 680 103095	For 5.5 mm plunger dia- meter there applies:
EFEP 500.. (8)	2 6 x 2 x 600 mm	2 207 + 3 bar (211+3kp/cm <sup>2</sup> )		2 0.5 mm dia	1 1.0 bar (kp/cm <sup>2</sup> )
EFEP 515.. (12)	3 M 12 x 1.5				2 1 417 413 012
EFEP 615.. (12)	1 1 680 750 008	1 0 681 343 009	1 0 681 443014	-----	3 Scavenging
	2 6 x 2 x 600 mm	2 172 + 3 bar (175+3kp/cm <sup>2</sup> )	2 S pintle nozzle		
* with large flywheel	3 M 14 x 1.5	1 1 688 901 016			
1 686 609 057 all injection pump versions	1 1 680 750 008	2 207 + 3 bar (211+3kp/cm <sup>2</sup> )	1 1 688 901999	1 1 680 103095	
1) up to PE(S) 5 MW 55.	2 6 x 2 x 600 mm			2 0.5 mm dia	
	3 M 14 x 1.5				

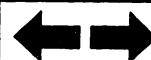
**A13**

General notes  
RQ/RQV governors



**A14**

General notes  
RQ/RQV governors



**Test benches and test equipment assigned to models of injection pump (continued)**

Pump model: PE(S)..P.. (as of 12 mm plunger diameter) - except PE(S)..P..7000 series

Approved pump best benches	Specified cal.fuel-injection tubing, cal. nozzle-and-holder assemblies				1 Inlet pressure
	1 Part No.	Model	cal. nozzle	perfor. plate	2 Overflow valve/ Part No.
Model designation (no. of measuring points) Remarks, restrictions	2 O.D. x wall thickness x length	1 Part No./ mod. desig.	1 Part No./ mod. desig.	1 Part No.	3 Remarks
	3 Delivery-valve holder thread	2 Opening pressure	2 Type	2 Bore dia.	
	4 Remarks				
EFEP 375.. (8) 1) * all pump versions EFEP 385.. (12) 2) * all pump versions EFEP 390.. (12) 3) *all pump versions EFEP 410.. (12) 1) *up to PE(S) 8P 130.. EPS 270.. (8) 1) up to PE(S) 6P 120.. EFEP 500.. (8) 1) up to PE(S) 6P 120.. EFEP 515.. (12) 4) all pump versions EFEP 615.. (12) 5) all pump versions *with large flywheel 1 686 609 057 Continued on A17/A18	1 1 680 750 060	1 0 681 443 022 EFEP 215 C	1 0 681 443021 EFEP 216A	-----	1 1.5 bar (kp/cm <sup>2</sup> ) 2 1 417 413 025 or as given in test- specification sheet for pump. 3 Scavenging
	2 8 x 2 x 1000 mm	2 172 + 3 bar (175+3kp/cm <sup>2</sup> )	2 T pintle nozzle		
	3 M 14 x 1.5				
	4 possible deviations (given on test-speci- fication sheet)				
	1 1 680 750 061	1 0 681 443 022 EFEP 215 C	1 0 681 443021 EFEP 216A	-----	
	2 8 x 2 x 1000 mm	2 172 - 3 bar	2 T pintle nozzle		
	3 M 16 x 1.5				
	1 1 680 750 067	1 1 688 901 019	1 1 688 901999	1 1 680 103098	
	2 6 x 1.5 x 1000 mm	2 207 + 3 bar (211+3kp/cm <sup>2</sup> )		2 0.8 mm dia	
	3 M 14 x 1.5				
	1 1 680 750 074	1 1 688 901 019			
	2 6 x 1.5 x 1000 mm	2 207 + 3 bar (207+3kp/cm <sup>2</sup> )			
	3 M 16 x 1.5				

**A15**

General notes

RQ/RQV governors



**A16**

General notes

RQ/RQV governors



Test benches and test equipment assigned to models of injection pump (continued)  
Pump model: PE(S)..P.. (as of 12 mm plunger diameter) - except PE(S)..P..7000 series

Approved pump test benches	Specified				1 Inlet pressure
	cal.fuel-injection tubing	cal. nozzle-and-holder assemblies			2 Overflow valve/ Part No.
Model designation (no of measuring points)	1 Part No.	Model	cal. nozzle	perfor. plate	3 Remarks
Remarks, restrictions	2 O.D. x wall thickness x length 3 Delivery-valve holder thread 4 Remarks	1 Part No./ mod. desig. 2 Opening pressure	1 Part No./ mod. desig. 2 Type	1 Part No. 2 Bore dia.	
If calibrating nozzle holders are to be used with perforated plate, the following applies: 1) up to PE(S) 6 P 120..., 2) up to PE(S) 8 P 120..., 3) up to PE(S) 12 P 120..., 4) up to PE(S) 8 P 130..., 5) all injection pump versions	1 1 680 750 015 2 6 x 1.5 x 600 mm 3 M 14 x 1.5	1 1 688 901019 2 207 + 3 bar	1 1 688 901999	1 1 680 103098 2 0.8 mm dia and 1 1 680 101096 2 0.6 mm dia	
	1 1 680 750 026 2 6 x 1.5 x 600 mm 3 M 14 x 1.5 together with connect- ing piece 1 683 391 118 9/16" x 18 1 1 680 750 074 2 6 x 1.5 x 1000 mm 3 M 16 x 1.5	1 0 681 443022 EFEP 215 C 2 172 + 3 bar  1 1 688 901019 2 207 + 3 bar (211+3kp/cm <sup>2</sup> )	1 1 688 901999	1 1 680 103098 2 0.8 mm dia	

**A17**

General notes  
RQ/RQV governors



**A18**

General notes  
RQ/RQV governors



Test benches and test equipment assigned to models of injection pump (continued)

Pump model: PE(S)..P..7000 series (as of 12 mm plunger diameter)

Approved pump test benches	Specified cal.fuel-injection tubing cal. nozzle-and-holder assemblies				1 Inlet pressure
	Model designation (no. of measuring points) Remarks, restrictions	1 Part No. 2 O.D. x wall thickness x length 3 Delivery-valve holder thread 4 Remarks	Model 1 Part No./mod. desg. 2 Opening pressure	cal. nozzle 1 Part No./mod. desg. 2 Type	perfor. plate 1 Part No. 2 Bore dia.
EFEP 515.. (12) 1) EFEP 615.. (12) EFEP 383.. (12) 2) EFEP 390.. (12) 2) 1) up to PE(S) 8 P 130..., 2) Approval of test bench models EFEP 385.. and EFEP 390.. each with large fly-wheel 1 686 609 057 for pumps up to PE(S) 8P 130.. is limited to end of 1986 due to ISO standards.	1 1 680 750 067 2 6 x 1.5 x 1000 mm 3 M 14 x 1.5 4 possible deviations (given on test-specification sheet)	1 1 688 901 019 2 207 + 3 bar (211+3kp/cm²)	1 1 688 901999	1 1 680 103098 2 0.8 mm dia	2 Overflow valve/ Part No. 3 Remarks
	1 1 680 750 015 2 6 x 1.5 x 500 mm 3 M 14 x 1.5	1 1 688 901 019 2 207 + 3 bar (211+3kp/cm²)	1 1 688 901999	1 1 680 102098 2 0.8 mm dia	1 1.5 bar (kp/cm²) 2 1 417 413 025 or as given in test-specification sheet for pump. 3 Scavenging

**A19**

General notes  
RQ/RQV governors



**A20**

General notes  
RQ/RQV governors



## 2. TEST BENCH ACCESSORIES

### 2.1 PE(S)..A.. pump assemblies

#### For clamping:

Clamping support	1 688 030 044
Clamping support	1 688 030 095
Universal clamping bracket	1 688 010 010
or	1 688 010 124
or	1 688 010 129
Locating bracket	1 688 010 033
Intermediate plate	1 682 308 010
Clamping support	1 688 030 021
Clamping flange	1 685 720 017
Reducing ring 72 mm diameter	1 680 103 007
Reducing ring 80 mm diameter	1 680 202 004
Reducing ring 85 mm diameter	1 680 202 005
Reducing ring 76.2 mm diameter	1 680 202 017
Clamping flange	1 685 720 014

#### For driving:

Coupling half, 17 mm cone diameter	1 686 430 022
Coupling half, 20 mm cone diameter	1 686 430 024
Puller	KDEP 1557

#### For measuring:

Control-rod-travel measuring device	1 688 130 095
or	1 688 130 130
Control-rod-travel measuring device	1 688 132 005
Control-rod-travel measuring device	0 681 440 009
Dial indicator	1 687 233 015



Test bench accessories (continued)

Shackle	1 682 329 038
Governor setting device	0 681 440 006
Adjustment throttle	1 688 130 132
Pressure regulator for compressed air with pressure gauge 0...4 bar	commercially available
Pressure gauge 0...1.6 bar; quality class 1.0 scale divisions 0.01	commercially available e.g. H. Wittig Vogelsangstr. 15 7000 Stuttgart 1

For adjusting:

Socket wrench set	KDEP 1047
Socket wrench set	KDEP 1048
Box wrench SW 10	KDEP 1547
Box wrench SW 9	KDEP 1633



## 2.2 PE(S)..MW.. pump assemblies

### For clamping:

Clamping support	1 688 030 111
with intermediate plate	1 682 310 026
Clamping support	1 688 030 122
Universal clamping bracket	1 688 010 010
or	1 688 010 124
or	1 688 010 129
Clamping flange	1 685 720 017
Clamping flange	1 685 720 060
Reducing ring	1 680 202 005

### For driving:

Coupling half, 17 mm cone diameter	1 686 430 022
Coupling half, 20 mm cone diameter	1 686 430 024
Coupling half, 25 mm cone diameter	1 686 430 026

### For measuring:

Control-rod-travel measuring device	1 680 130 030
with tube fitting	1 683 350 065
with driver pin	1 683 201 013
or	
Control-rod-travel measuring device	1 680 130 130
with tube fitting	1 683 350 064
with accessory set	1 687 000 053
Control-rod-travel measuring device	1 688 130 095
Dial indicator	1 687 233 015
Shackle	1 682 329 038
Governor setting device	0 681 440 006
Adjustment throttle	1 688 130 132
Pressure regulator for compressed air with pressure gauge 0...4 bar	commercially available



## Test bench accessories (continued)

Pressure gauge

0...1.6 bar; quality class 1.0

scale divisions 0.05

commercially  
available

e.g.

H. Wittig

Vogelsangstr. 15

7000 Stuttgart 1

### For adjusting:

Socket wrench set

Socket wrench set

Box wrench SW 10

Box wrench SW 9

KDEP 1047

KDEP 1048

KDEP 1547

KDEP 1633



## 2.3 PE(S)..P.. pump assemblies

### For clamping:

Clamping support	1 688 120 032
Clamping support	1 688 030 095
Support block	1 688 030 033
Clamping support	1 688 030 047
Universal clamping bracket	1 688 010 010
Clamping bracket	1 688 010 040
Clamping bracket	1 688 010 042
Clamping bracket	1 688 010 044
Clamping flange	1 685 720 060
Clamping flange	1 685 720 159

### For driving:

Coupling half	1 688 432 007
Coupling half, 25 mm cone diameter	1 686 430 030
Coupling half, 30 mm cone diameter	1 686 430 032
Coupling half, 35 mm cone diameter	1 686 430 017
Puller	KDEP 1557

### For measuring:

Control-rod-travel measuring device	1 688 130 130
With accessory set	1 687 000 053
Accessories	1 687 000 061
Control-rod-travel measuring device	1 680 130 030
Bushing, short	1 680 362 019
Bushing, long	1 683 350 016
Control-rod-travel measuring device	1 688 130 038
Control-rod-travel measuring device	1 688 130 079
Control-rod-travel measuring device	1 688 130 095



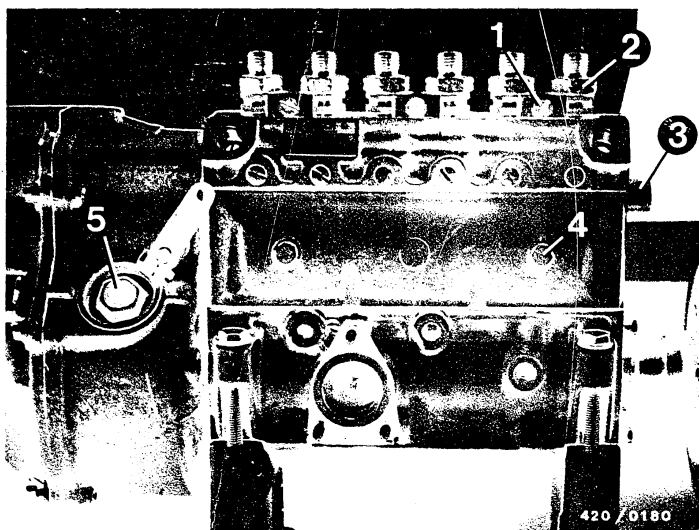
## Test bench accessories (continued)

Dial indicator	1 687 233 015
Shackle	1 682 329 038
Governor setting device	0 681 440 006
Clamping device	1 688 040 122
Adjustment throttle	1 688 130 132
Pressure regulator for compressed air with pressure gauge 0...4 bar	commercially available
Pressure gauge 0...1.6 bar, quality class 1.0 scale divisions 0.01	commercially available e.g. H. Wittig Vogelsangstr. 15 7000 Stuttgart 1

### For adjusting:

Socket wrench set	KDEP 1047
Socket wrench set	KDEP 1048
Box wrench SW 10	KDEP 1547
Box wrench SW 9	KDEP 1633





### 3. TIGHTENING TORQUES

#### 3.1 Tightening torques PE(S)..A..

1 = Fillister-head screw

5 ... 6.5 Nm

2 = Delivery-valve holder

	Double seal	
	Delivery-valve holder without ID groove	Delivery-valve holder with ID groove
Model		
PE(S)..A..C.	45-0-45-0- 45...50 Nm	-
PE(S)..A..D.	-	40-0-40-0-40...45Nm* 30-0-30-0-33...37Nm**

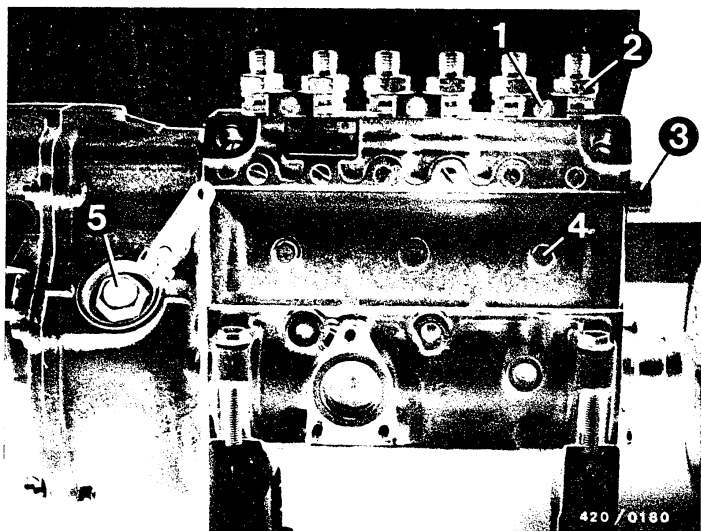
\* for PE(S) 2..6A..D..

\*\* for PE(S) 8..12A..D..

**B3**

Tightening torques  
RQ/RQV governors



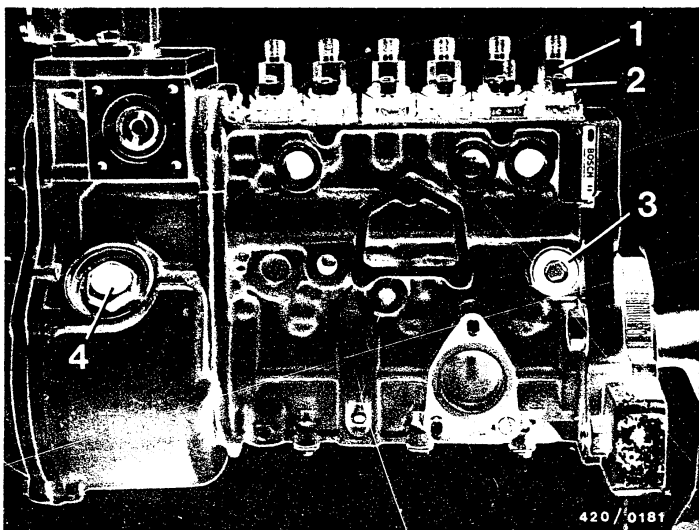


3 = Control-rod-closure cap	10 ... 11 Nm
4 = Spring-chamber cover fastening screws	4 ... 5 Nm
5 = Screw plug	30 ... 40 Nm

**B4**

Tightening torques  
RQ/RQV governors

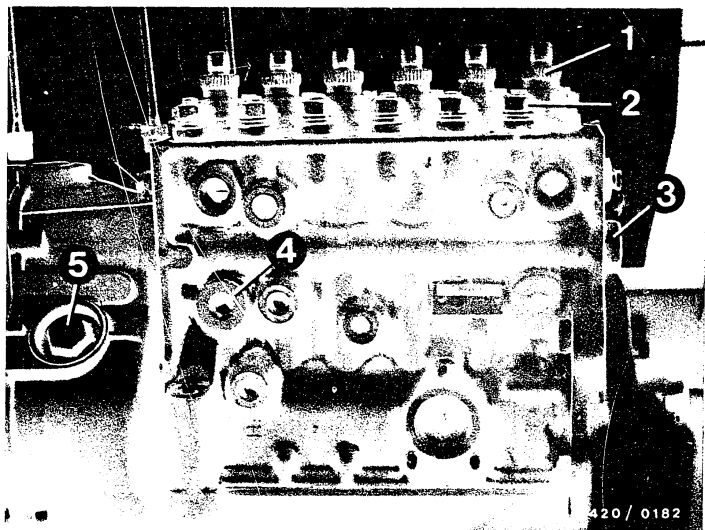




### 3.2 Tightening torques PE(S)..MW..

1 = Delivery-valve holder	50 ... 60 Nm
2 = Hexagon nut M8	20 ... 25 Nm
3 = Screw plug	30 ... 40 Nm
4 = Screw plug	30 ... 40 Nm





### 3.3 Tightening torques PE(S)..P..

1 = Delivery-valve holder

Model	Thread	
PE(S)..P../..	M26 x 1.5	65 ... 80 Nm
PE(S)..P..A..	M26 x 1.5	80 ... 90 Nm
PE(S)..P..A..	M22 x 1.5	110 .. 120 Nm

2 = Hexagon nut 40 ... 45 Nm

3 = Closure cap 40 ... 60 Nm

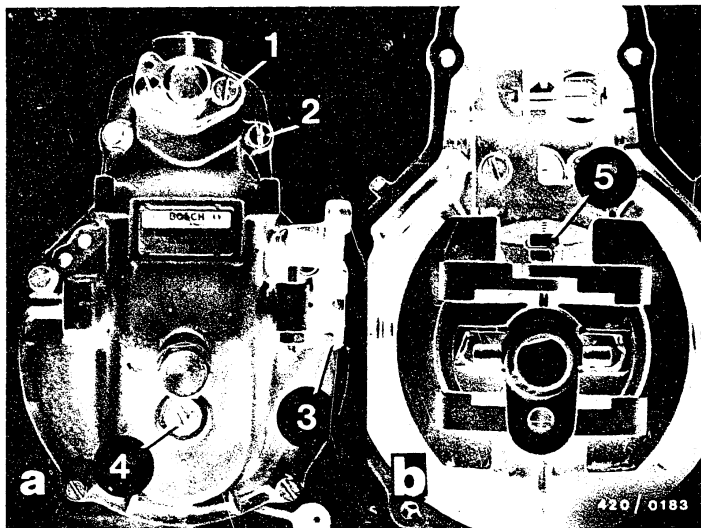
4 = Screw plug 40 ... 60 Nm

5 = Screw plug 30 ... 40 Nm

**B6**

Tightening torques  
RQ/RQV governors

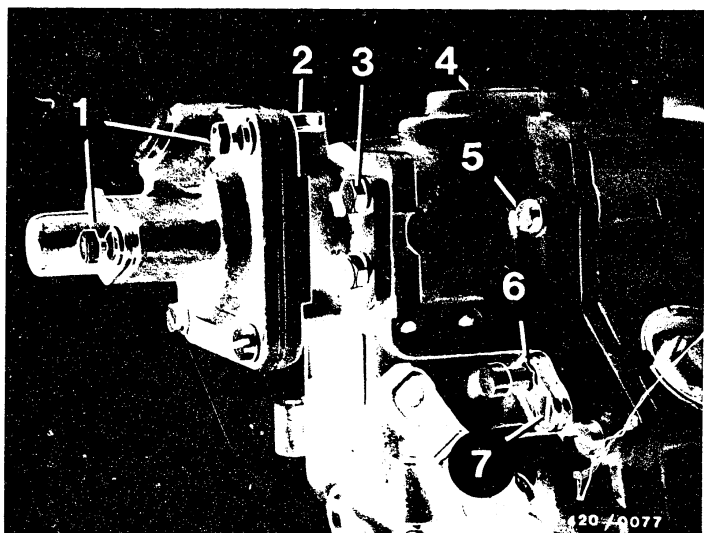




3.4 Tightening torques for RQ..AB.,  
 RQ..MW.,  
 RQ..PA.,  
 RQV..AB.,  
 RQV..MW.,  
 RQV..PA.,

1 = Fillister-head screw	4 ... 6 Nm
Capstan screw	4 ... 6 Nm
Break-off screw	2 ... 3 Nm
2 = Flat-head screw	6 ... 8 Nm
Fillister-head screw	7 ... 9 Nm
3 = Clamping screw	11 ... 13 Nm
4 = Guide pin	7 ... 9 Nm
5 = Hexagon nut	6 ... 8 Nm

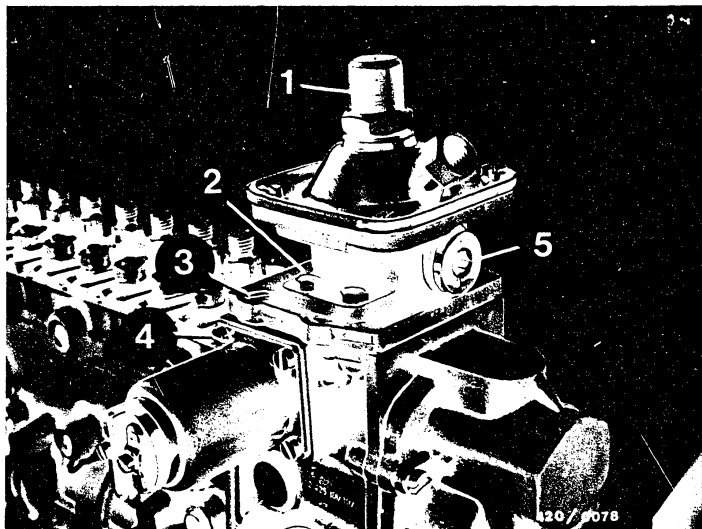




### Tightening torques (continued)

1 = Break-off screw (broken off after adjusting)	2 ... 3 Nm
2 = Screw plug	30 ... 35 Nm
3 = Hexagon screw	5 ... 7 Nm
4 = Screw plug	10 ... 15 Nm
5 = Fillister-head screw	7 ... 9 Nm
6 = Hexagon nut	6 ... 8 Nm
7 = Sealing screw	5 ... 7 Nm

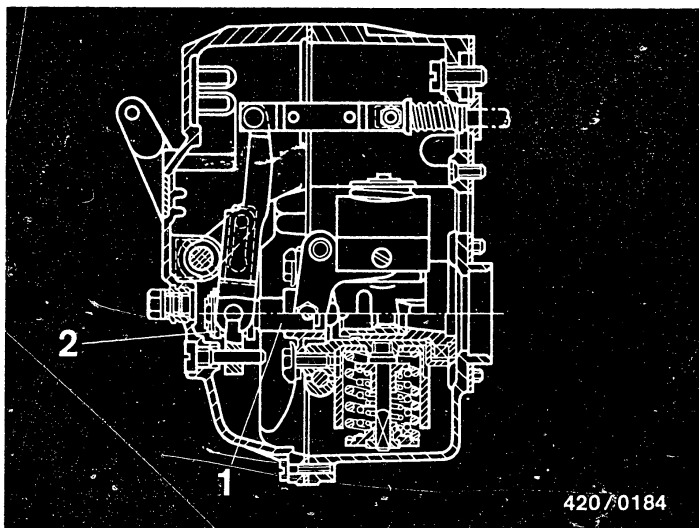




### Tightening torques (continued)

1 = Cap nut	25 ... 35 Nm
2 = Hexagon screw	5 ... 7 Nm
3 = Fillister-head screw	5 ... 7 Nm
4 = Fillister-head screw	3 ... 4 Nm
5 = Screw plug	30 ... 35 Nm





- 1 = Bearing pin  
2 = Shims

#### ADJUSTING RQ GOVERNORS

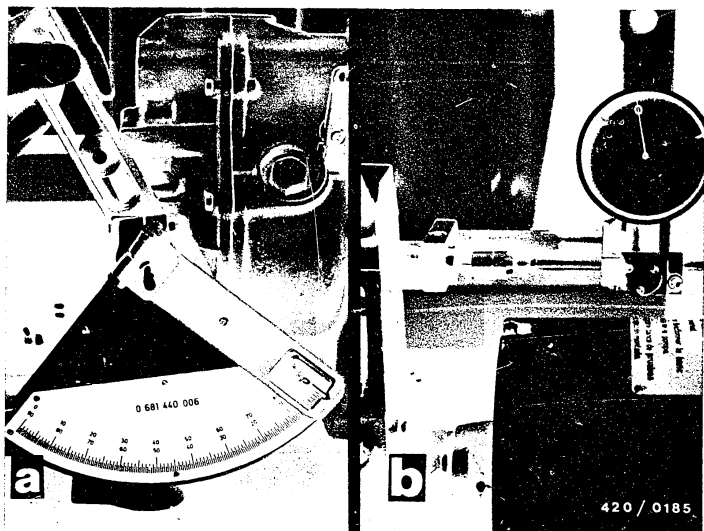
##### 4. Adjusting the sleeve position 1

Manifold-pressure compensator (if applicable) removed.  
Governors with rigid bearing pin.

At  $n = 0 \text{ min}^{-1}$  turn back stop screws and, with control lever in fuel shutoff position, set control-rod travel dial indicator to 0. Then hold control lever at "MAX" with extension spring (max. deflection).

At the stated speed, the specified control-rod travel must be obtained. If not, after removing governor cover, change position of slider by changing over the shims (2). But at least 2 shims must be left on each side. The threaded pins of the flyweights must project by approx. 1 mm at the adjusting nut.





### Governors with spring-loaded bearing pin

Mount setting device 0 681 440 006. Screw back shutoff and full-load stop screws entirely. Bring control lever into shutoff position and, from this position, return slowly toward "MAX". Watch control-rod travel dial indicator. When the governor control lever is moved, as soon as the control-rod travel indicator indicates that the control rod is also moving, set scale of setting device 0 681 440 006 to 0°.

**C2**

Adjusting the sleeve position  
RQ governors



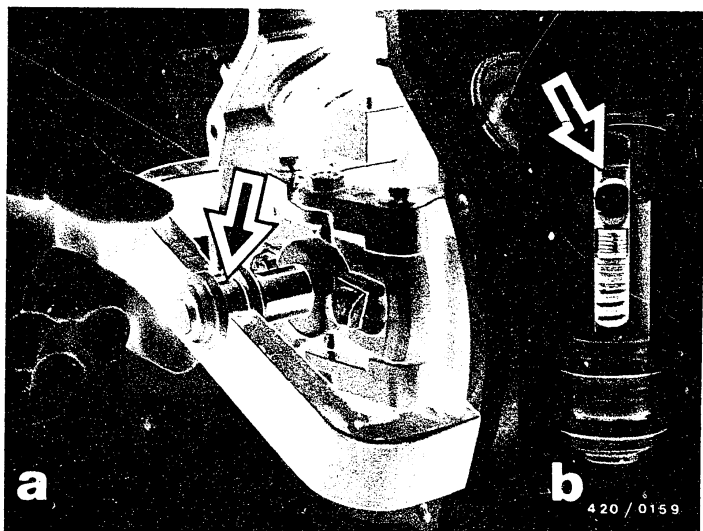
Drive the injection-pump assembly at the specified speed. Move control lever toward "MAX" until the specified control-rod travel is obtained. Read off position of control lever on setting device 0 681 440 006 and compare with the value given in the test-specification sheet.

**C3**

Adjusting the sleeve position \_\_\_\_\_

RQ governors





If the specified angle position is not obtained, remove the governor cover. Remove fulcrum lever and slider and check sleeve position with measuring shackle 1 682 329 038 (picture a).

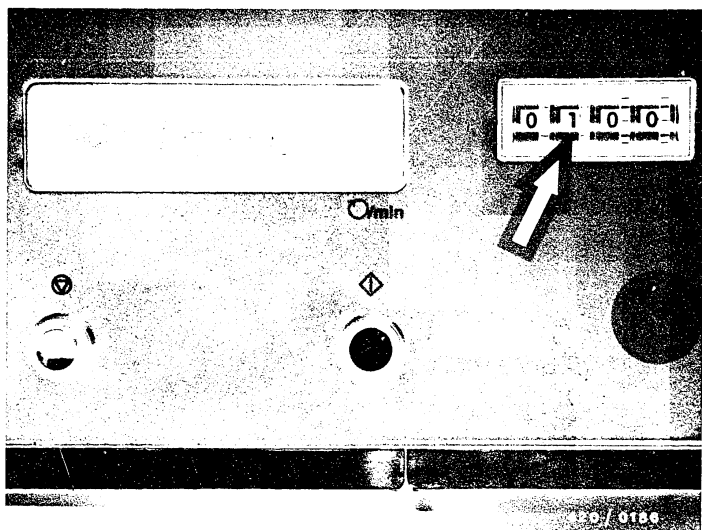
Adjustment is performed by turning the adjusting screw with the sliding bolt removed (picture b - arrow).

After adjusting, re-assemble governor and screw down governor cover.

**C4**

Adjusting the sleeve position  
RQ governors



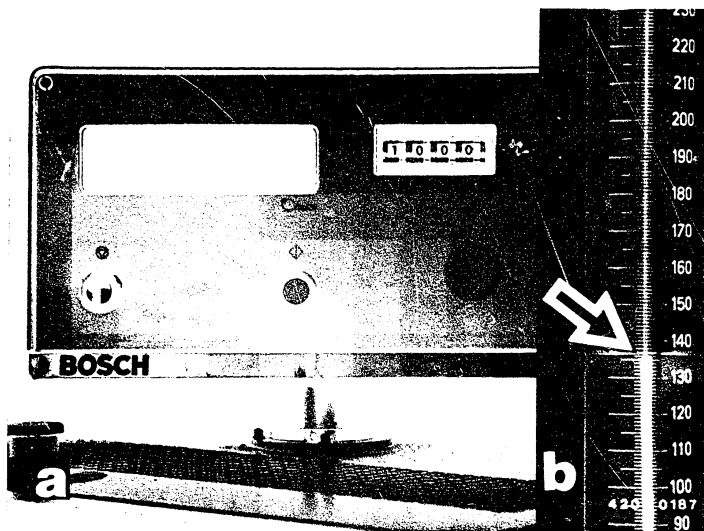


## 5. Adjusting the full-load delivery

### Governors without manifold-pressure compensator 2

Drive injection-pump assembly at specified speed. Set stroke counter to "100" and switch on. The quantity of calibrating oil which is caught in the measuring glasses of the test bench is used in the first measurement not for measuring the fuel delivery, but for wetting the measuring glasses. The measuring glasses are again emptied. The discharge time is 29 to 31 seconds. If the pause after discharging is longer than 10 minutes, wet measuring glasses again.





Set stroke counter to "1000" and trigger. After the stroke counter has completed the measurement, read off the quantity of calibrating oil in each measuring glass and note down.

A blue stripe, which is opposite the numbering on the measuring glass, is used for an accurate reading of the quantity of calibrating oil in the measuring glass. If the measuring glass is wetted, light refraction at the surface of the liquid results in two superimposed points. Always read off the fuel delivery at the scale mark indicated by the two points.

The fuel delivery given in the test specifications is the average of all individual deliveries measured. Also establish whether the allowable dispersion given in the test specifications is exceeded. The dispersion indicates the difference between the largest and the smallest fuel deliveries.

Example

Specified delivery = 121...123 cm<sup>3</sup>/1000 strokes

Allowable dispersion = 3 cm<sup>3</sup>/1000 strokes

Measurement 1

Cylinder No.	1	2	3	4	5	6	Average
Delivery	124	122	125	123	125	124	123.8

Dispersion: 125-122 = 3cm<sup>3</sup>/strokes

This setting is not allowable; the average of all cylinders is not between 121 and 123 cm<sup>3</sup> / 1000 strokes.

Measurement 2

Cylinder No.	1	2	3	4	5	6	Average
Delivery	124	122	120	123	121	124	122.3

Dispersion: 124-120 = 4 cm<sup>3</sup>/1000 strokes

This setting is likewise not allowable; the dispersion is greater than 3 cm<sup>3</sup>/1000 strokes.



### Measurement 3

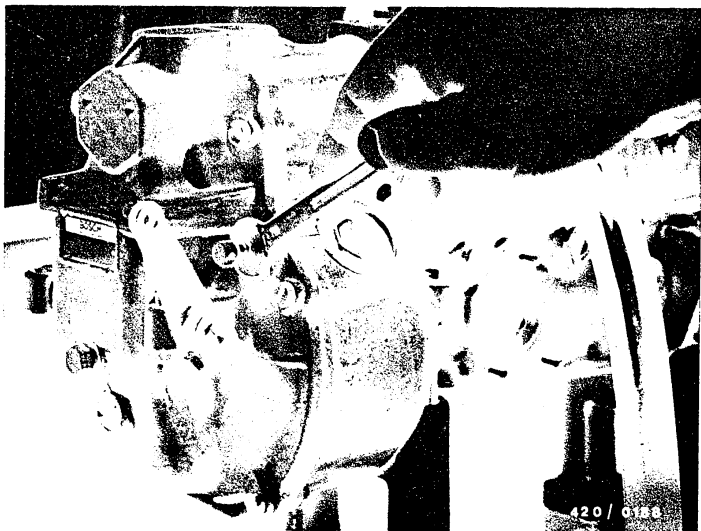
Cylinder No.	1	2	3	4	5	6	Average
Delivery	124	122	122	123	121	124	122.6

Dispersion:  $124 - 121 = 3 \text{ cm}^3/1000 \text{ strokes}$

This setting is allowable

Figures in parentheses apply only when checking a pump,  
not when resetting it.





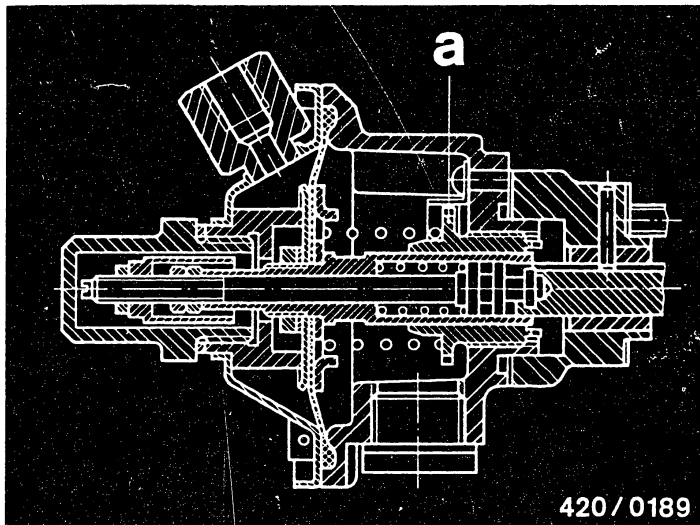
If the full-load delivery as measured does not agree with the specified value, change the position of the governor control lever by appropriate adjustment of the full-load delivery adjusting screw until the required full-load delivery is obtained.

When the correct full-load delivery has been obtained, tighten the lock nut of the full-load delivery adjusting screw.

Caution:

The governor must not yet have pulled the control rod out of its full-load position.





6. Mounting the manifold-pressure compensator according to installation position

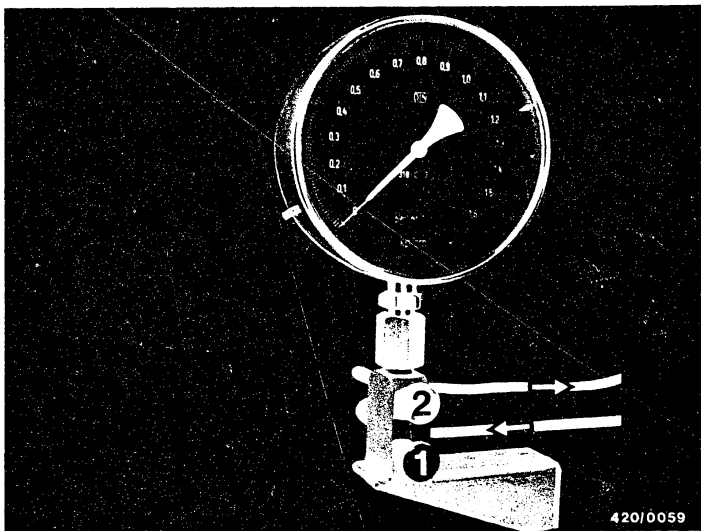
If the manifold-pressure compensator is mounted at the drive end, mount control-rod-travel measuring device 1 687 130 130 with accessories 1 687 000 061, and set the dial indicator to "0" with the control rod in the shutoff position.

Fully relax the manifold-pressure compensator spring by screwing back the adjusting screw (a).

**C10**

Mounting the manifold-pressure comp.  
RQ governors with manifold-pressure comp.





Adjusting screw 1 (bottom) for adjusting the pressure.

Screw plug 2 (top) for leak test on diaphragm chamber.

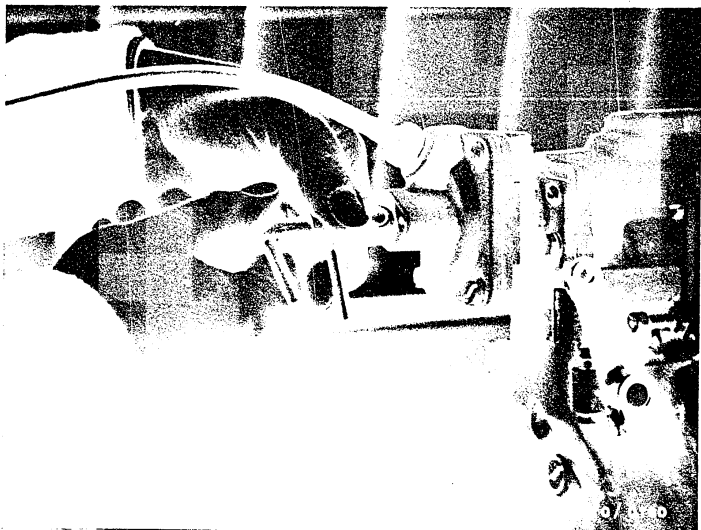
Connection of manifold-pressure compensator

Establish connection between pressure regulator and bottom connection of adjustment throttle. Connect manifold-pressure compensator to the top connection of the adjustment throttle.

**C11**

Mounting the manifold-pressure comp.  
RQ governors with manifold-pressure comp.



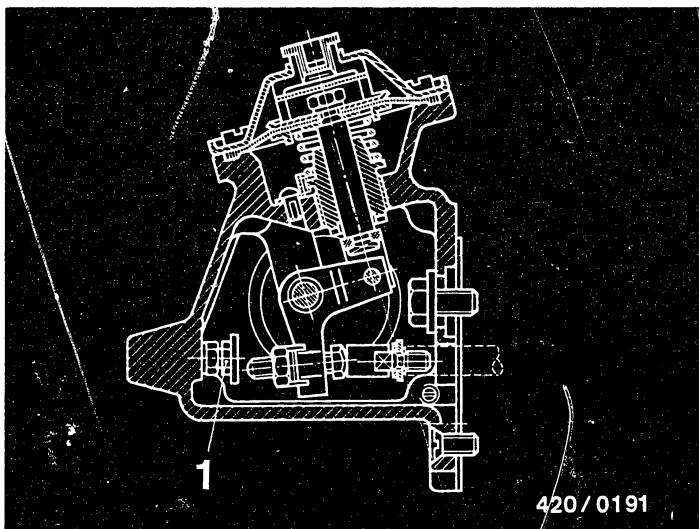


Governors with manifold-pressure compensator  
(mounted on governor end) 2

Apply the specified charge-air pressure to the manifold-pressure compensator. Using socket wrench set KDEP 1047, screw back delivery adjusting screw until it cannot influence the control rod.

Drive injection-pump assembly at specified speed. Set stroke counter to "100" and switch on. The quantity of calibrating oil which is caught in the measuring glasses of the test bench is used in the first measurement not for measuring the fuel delivery, but for wetting the measuring glasses. The measuring glasses are again emptied. The discharge time is 29 to 31 seconds. If the pause after discharging is longer than 10 minutes, wet measuring glasses again.





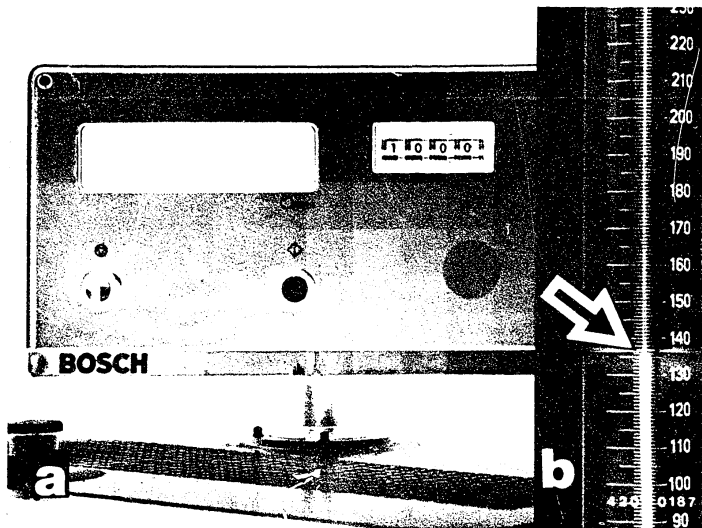
420 / 0191

Governors with manifold-pressure compensator, mounted at drive end 2

Apply the specified charge-air pressure to the manifold-pressure compensator. Screw back delivery adjusting screw (1) until the manifold-pressure compensator cannot influence the control rod.

Drive injection-pump assembly at specified speed. Set stroke counter to "100" and switch on. The quantity of calibrating oil which is caught in the measuring glasses of the test bench is used in the first measurement not for measuring the fuel delivery, but for wetting the measuring glasses. The measuring glasses are again emptied. The discharge time is 29 to 31 seconds. If the pause after discharging is longer than 10 minutes, wet measuring glasses again.





Set stroke counter to "1000" and trigger. After the stroke counter has completed the measurement, read off the quantity of calibrating oil in each measuring glass and note down.

A blue stripe, which is opposite the numbering on the measuring glass, is used for an accurate reading of the quantity of calibrating oil in the measuring glass. If the measuring glass is wetted, light refraction at the surface of the liquid results in two superimposed points. Always read off the fuel delivery at the scale mark indicated by the two points.

The fuel delivery given in the test specifications is the average of all individual deliveries measured. Also establish whether the allowable dispersion given in the test specifications is exceeded. The dispersion indicates the difference between the largest and the smallest fuel deliveries.

### Example

Specified delivery = 121...123 cm<sup>3</sup>/1000 strokes

Allowable dispersion = 3 cm<sup>3</sup>/1000 strokes

### Measurement 1

Cylinder No.	1	2	3	4	5	6	Average
Delivery	124	122	125	123	125	124	123.8

Dispersion: 125 - 122 = 3 cm<sup>3</sup>/1000 strokes

This setting is not allowable; the average of all cylinders is not between 121 and 123 cm<sup>3</sup>/1000 strokes.

### Measurement 2

Cylinder No.	1	2	3	4	5	6	Average
Delivery	124	122	120	123	121	124	122.3

Dispersion: 124-120 = 4 cm<sup>3</sup>/1000 strokes

This setting is likewise not allowable; the dispersion is greater than 3 cm<sup>3</sup>/1000 strokes.



Cylinder No.	1	2	3	4	5	6	Average
Delivery	124	122	122	123	121	124	122.6

Dispersion:  $124 - 121 = 3 \text{ cm}^3/1000 \text{ strokes}$

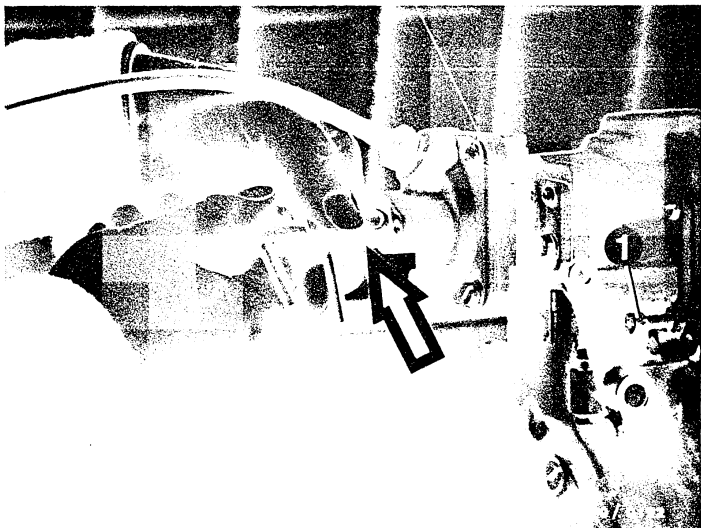
This setting is allowable.

Figures in parentheses apply only when checking a pump, not when resetting it.

**C16**

Mounting the manifold-pressure comp.  
RQ governors with manifold-pressure comp.



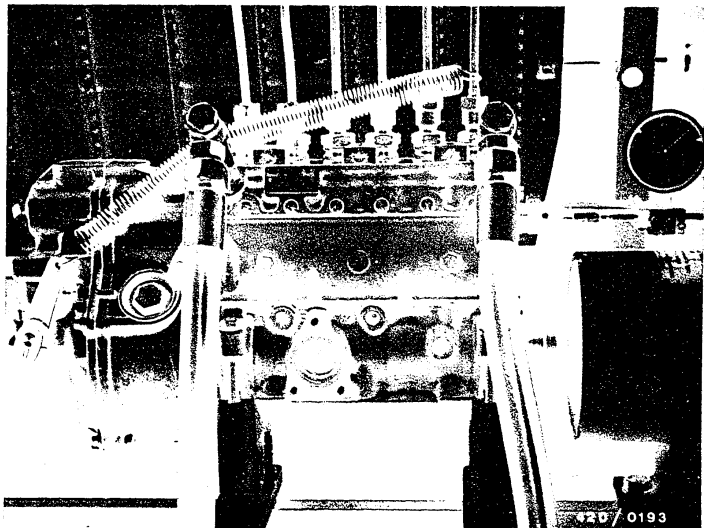


If the full-load delivery as measured does not agree with the specified value, change the position of the governor control lever by appropriate adjustment of the full-load delivery adjusting screw until the required full-load delivery is obtained.

When the correct full-load delivery has been obtained, tighten the lock nut of the full-load delivery adjusting screw.

Then, using socket wrench set KDEP 1047 (arrow), turn delivery adjusting screw on manifold-pressure compensator until it touches the control rod.





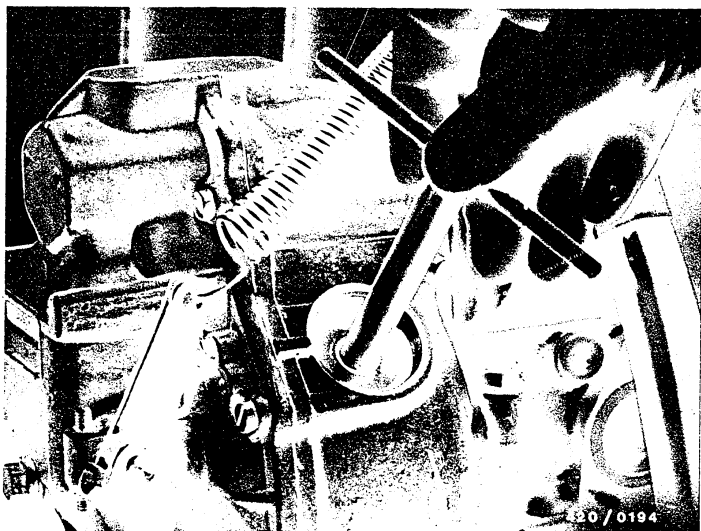
#### 7. Setting the maximum full-load speed    4

Bring governor control lever up against full-load delivery adjusting screw and hold in this position - using extension spring if necessary. Charge-air pressure remains applied to the manifold-pressure compensator. Slowly raise pump speed until the 1st control-rod travel given in the test-specification sheet is obtained. Read off speed and compare to the speed in the test-specification sheet.

**C18**

Setting the max. full-load speed \_\_\_\_\_  
RQ governors with manifold-pressure comp.





If the measured speed is not within the tolerance of the stated speeds, unscrew lateral screw plug from governor housing and, by turning the adjusting nuts on both flyweights using pin-type socket wrench KDEP 2989, change the preload of the flyweight springs until the specified speed value is obtained. Make sure that both adjusting nuts are moved by the same amount. Maximum difference: 1 notch.  
Screw in screw plug again.

**C19**

Setting the max. full-load speed

RQ governors



Continue to raise speed until the second control-rod travel in the test-specification sheet is obtained. Read off speed and compare to the speed in the test-specification sheet. If this speed does not agree with the specified speed, it is possible to make an adjustment by again turning the adjusting nuts of the flyweight springs.

However, it will then be necessary again to check the control-rod travel and the speed for the 1st control-rod travel. If an adjustment is not possible in the manner described, replace the complete flyweight spring set for a new one.

Repeat setting of governor.



If further control-rod travels and speeds are specified, these are tested next.

The speed tolerance must be obtained with rising and falling speeds.

With rising speed, screw in the overspeed monitoring switch (if applicable) until the connected lamp lights up.



## 8. Setting the minimum full-load speed    5

Drive the pump at the specified speed for the setting point.

Swivel control lever out of full-load position toward "SHUTOFF" until the respective control-rod travel is obtained.

Hold control lever in this position and check whether the corresponding control-rod travels are obtained at the specified speeds.

If not, it is possible to make an adjustment by turning the adjusting nuts of the flyweight springs.

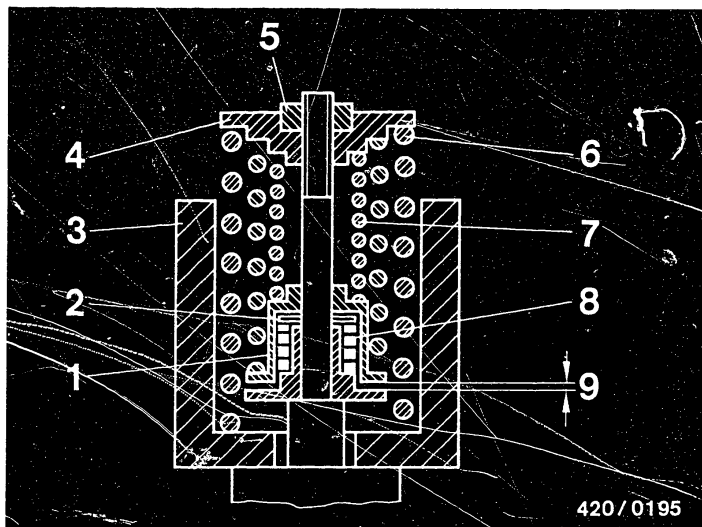
However, it will then be necessary again to check the control-rod travels and speeds for the maximum full-load speed.

If the service-parts list provides for washers under the idle spring, it is possible to make an adjustment by selecting the appropriate washer.

If an adjustment is not possible in the manner described, replace the complete flyweight spring set with a new one.

Repeat setting of governor.





420 / 0195

### 9. Checking the torque-control characteristic 3'

Bring the governor control lever up against the full-load delivery adjusting screw and hold. Set the 1st speed in the "TORQUE CONTROL" section and read off the control-rod travel obtained. This is the full-load control-rod travel. It serves as the starting point when measuring/setting the following control-rod travels of the torque-control characteristic.



Raise the speed as given in the test specifications and read off the control-rod travels thereby obtained. If they do not agree with the specified ones, remove torque control as specified and check/adjust "dimension a".

Re-install torque control and re-insert flyweight springs into flyweights as specified.

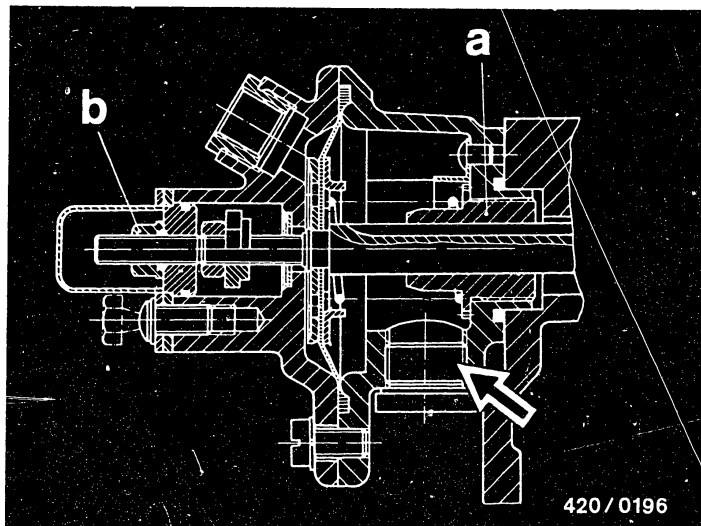
If, in spite of dimension "a" having been correctly adjusted, there is no improvement in the torque-control characteristic, it is possible to adjust the torque-control characteristic by deviating from dimension "a". However, remember that it may again be necessary to change the setting of the torque-control characteristic during the subsequent checking of the fuel-delivery characteristic.



#### 10. Checking the adjustment of the manifold-pressure compensator

Drive the injection-pump assembly at the specified speed. The specified charge-air pressure for adjusting results in the stated control-rod travel insofar as the specified values have been complied with in the preceding adjustments. Preload the adjusting screw of the manifold-pressure compensator spring by screwing out until the control-rod travel dial indicator indicates that the control rod is beginning to move.





### Measuring:

At the same speed, set the pressure required for measuring. Read off the control-rod travel.

If the specified pressure is given as 0 bar, the control-rod travel is adjusted at the adjusting screw (b) for the "naturally-aspirated delivery".

If the specified pressure is greater than 0 bar, set this pressure. Read off the control-rod travel obtained and adjust by changing the manifold-pressure compensator spring adjusting screw (a). As a check, the other pressures are set and the resulting control-rod travels are read off. If they do not agree with the ones given in the test specifications, the manifold-pressure compensator spring must be replaced by a new one.



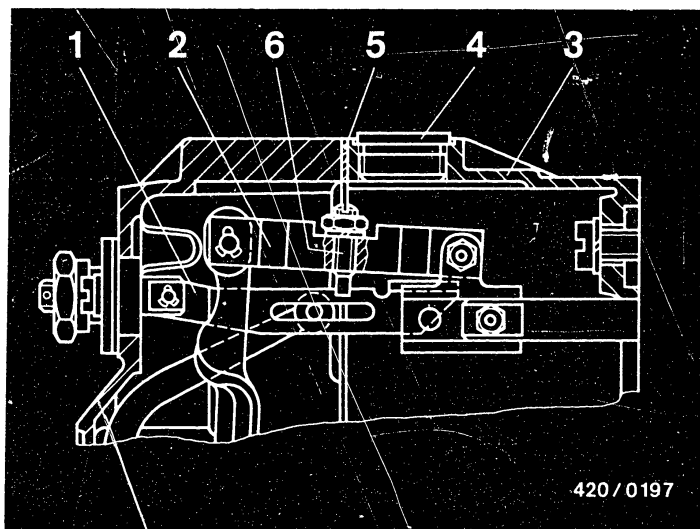
### 11. Leak test on manifold-pressure compensator

Seal all openings of the manifold-pressure compensator. Set 1.0 bar charge-air pressure. Close screw plug of adjustment throttle 1 688 130 132 and shut off air supply. The pressure gauge may indicate max. 0.03 bar pressure drop within 10 sec.

**D3**

Leak test on manifold-pressure comp.  
RQ governors





420 / 0197

1 = Stop strap  
2 = Link fork  
3 = Housing

4 = Screw plug  
5 = Seal  
6 = Adjusting screw

## 12. Adjusting the change-over point

If the governor is equipped with the adjusting screw and strap shown in the picture, the change-over point from "START" to "FULL LOAD" is adjusted by turning the adjusting screw (6) which is accessible after removing the screw plug (4). Starting from 0 min<sup>-1</sup> slowly raise the speed. The governor control lever is constantly moved from "SHUTOFF" to "MAX" and vice versa. As soon as the control rod moves only to the full-load position, the change-over speed has been reached. Adjustments are made at the adjusting screw (6) with a screwdriver and box wrench KDEP 1547 or KDEP 1633.



### 13. Measuring the fuel delivery characteristic: 3b

Set the control lever to maximum deflection.

Set the specified charge-air pressure (if pump has a manifold-pressure compensator). Drive pump at specified speed and measure fuel delivery. The value given in the test specifications must be obtained when resetting. The value in parentheses applies only when checking a pump.

If more than one measuring point is given for the fuel delivery characteristic, these are checked one after the other while complying with the specified charge-air pressures and speeds.

The fuel delivery given in the test specifications is the average of all individual deliveries measured. Also establish whether the allowable dispersion given in the test specifications is exceeded. The dispersion indicates the difference between the largest and the smallest fuel deliveries.

#### Example

Specified delivery - 121-123 cm<sup>3</sup>/1000 strokes

Allowable dispersion = 3 cm<sup>3</sup>/1000 strokes

#### Measurement 1

Cylinder No.	1	2	3	4	5	6	Average
Delivery	124	122	125	123	125	124	123.8

Dispersion: 125-122 = 3 cm<sup>3</sup>/1000 strokes

This setting is not allowable; the average of all cylinders is not between 121 and 123 cm<sup>3</sup>/1000 strokes.



### Measurement 2

Cylinder No.	1	2	3	4	5	6	Average
Delivery	124	122	120	123	121	124	122.3

Dispersion:  $124 - 120 = 4 \text{ cm}^3/1000 \text{ strokes}$

This setting is likewise not allowable; the dispersion is greater than  $3 \text{ cm}^3/1000 \text{ strokes}$ .

### Measurement 3

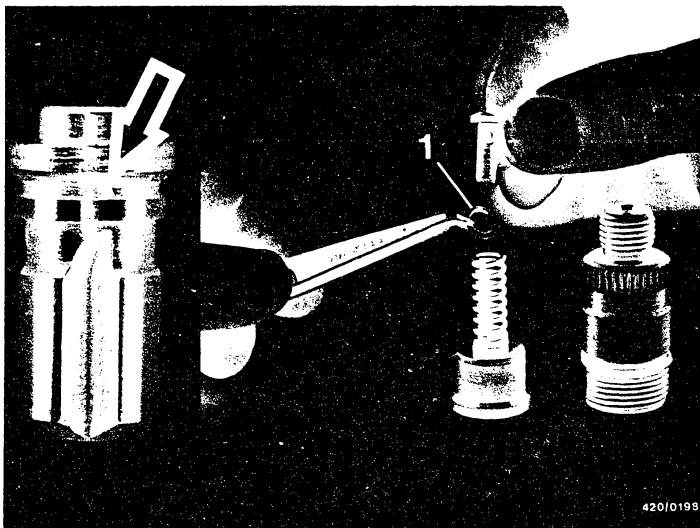
Cylinder No.	1	2	3	4	5	6	Average
Delivery	124	122	122	123	121	124	122.6

Dispersion:  $124 - 121 = 3 \text{ cm}^3/1000 \text{ strokes}$ .

This setting is not allowable.

If the specified fuel deliveries are not obtained at the specified speeds and charge-air pressures, it is possible to obtain the corresponding values by changing the torque control.





420/0199

### Adjustment in the case of torque-control delivery valves

Torque-control delivery valves can be identified by the small bore (arrow) between sealing cone and retraction collar of the valve cone.

If the specified values for the fuel delivery characteristic are not obtained, set the specified fuel delivery characteristic by selecting appropriately thick shims (1) between valve spring and filler piece.

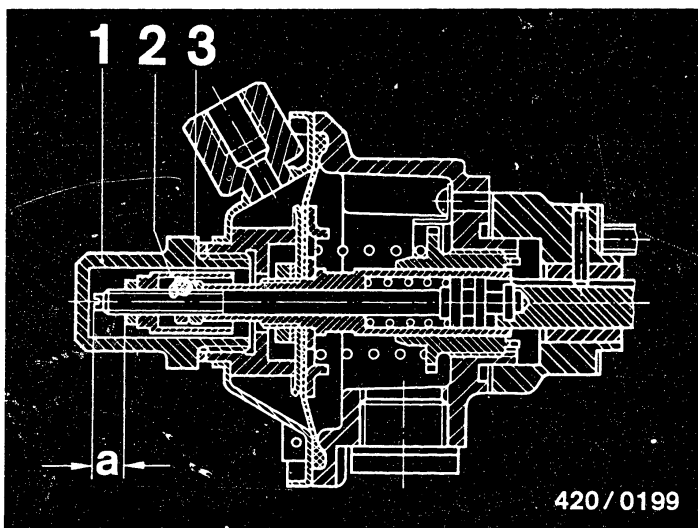
**D7**

Measuring the fuel-deliv. characteristic  
RQ governors



Measure the "naturally-aspirated delivery" at charge-air pressure of 0 mbar and at the specified speed.  
If the measured fuel delivery does not agree with that in the test-specification sheet, an adjustment is made at the corresponding adjusting screw or adjusting nut, depending on the version of manifold-pressure compensator.





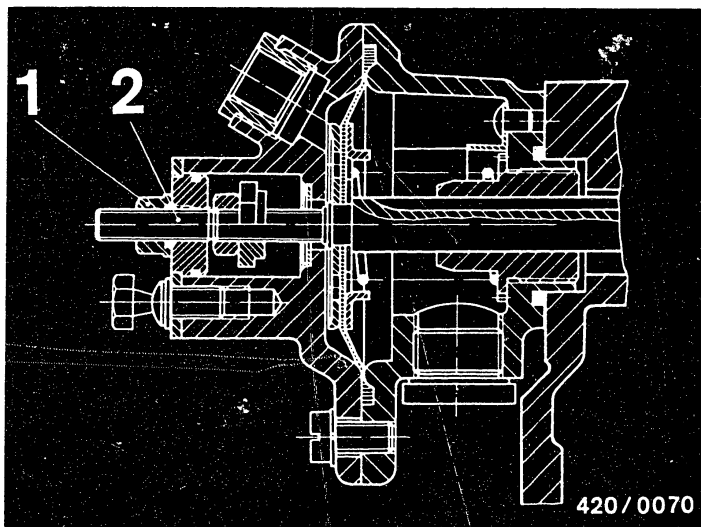
420/0199

Adjustment of fuel delivery at 0 mbar charge-air pressure (naturally-aspirated delivery) on manifold-pressure compensators of older type (mounted horizontally or vertically).

After unscrewing the cap (1), measure dimension "a" and note down. Unscrew adjusting sleeve (2) and set full-load delivery for naturally-aspirated operation at 0 bar at the nuts (3).

When assembling, reset dimension "a" and check full-load delivery with charge-air pressure. If necessary, correct by turning the sleeve (2).

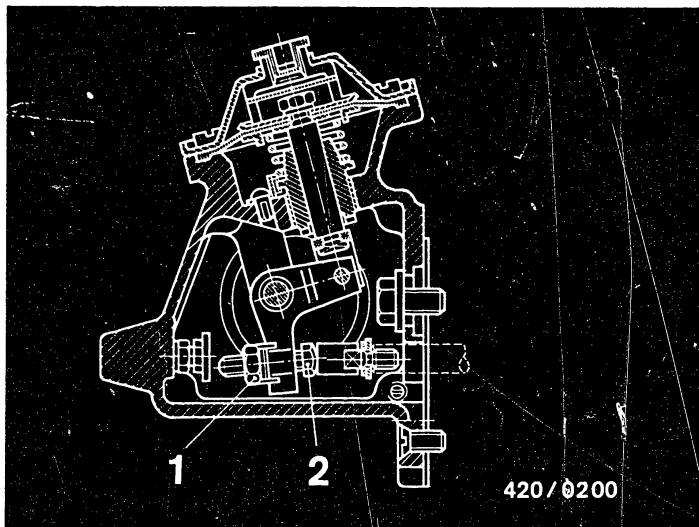




Adjustment of fuel delivery at 0 mbar charge-air pressure (naturally-aspirated delivery) on manifold-pressure compensators of new type (standard manifold-pressure compensator, mounted horizontally or vertically).

After taking off the closure cap of the manifold-pressure compensator, hexagon nut (1) with adjusting tool KDEP 1048 and set the fuel delivery at the threaded pin (2).

After adjustment is completed, tighten the hexagon nut and re-mount the closure cap.



420/0200

Adjustment of fuel delivery at 0 mbar charge-air pressure (naturally-aspirated delivery) for manifold-pressure compensator mounted at drive end.

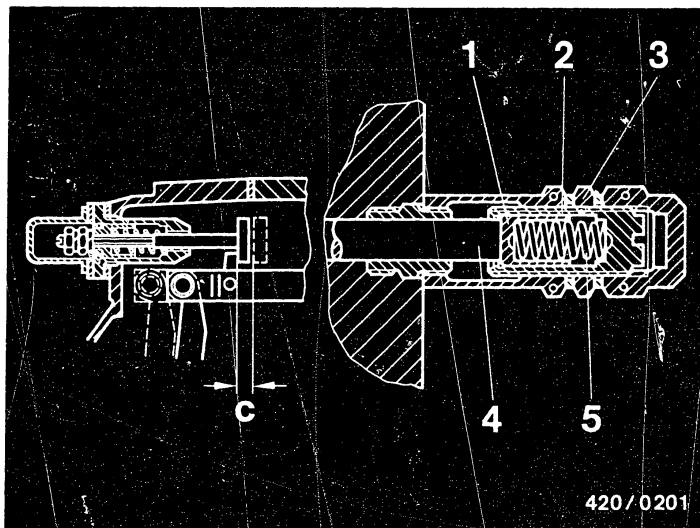
Remove control-rod travel measuring device.

Loosen lock nut (1) and turn adjusting screw (2) until the specified fuel delivery is obtained. After adjustment is completed, re-tighten lock nut (1).

**D11**

Measuring the fuel-deliv. characteristic  
RQ governors





420 / 0201

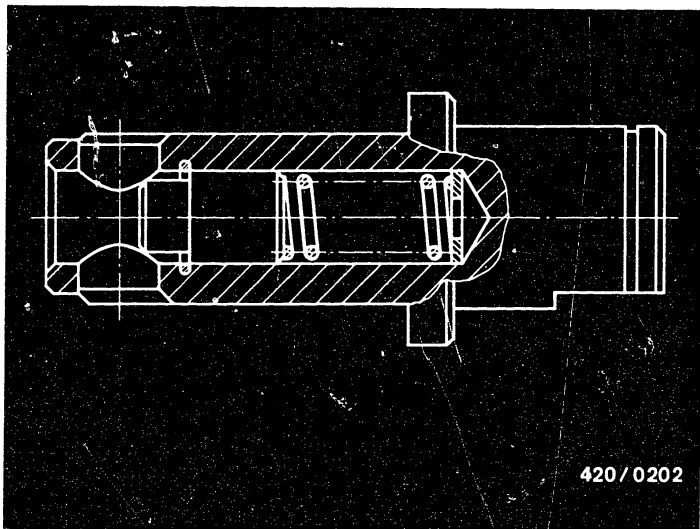
- |                            |                    |
|----------------------------|--------------------|
| c = Starting fuel delivery | 3 = Lock nut       |
| 1 = Stop bushing           | 4 = Helical spring |
| 2 = Adjusting bushing      | 5 = Control rod    |

#### 14. Adjusting the automatic control-rod stop 3a

Move control lever from "SHUTOFF" to "MAX", checking the control rod for freedom of movement. With control lever at "MAX", read off the control-rod travel: at cranking speed the control-rod travel must be approx. 5 mm greater or as stated.

Torque-control travel, setting of control-rod stop and fuel-delivery characteristic may be dependent on each other. At the same specified speed, an excessive fuel delivery can be influenced by reducing it with the control-rod stop. This means that a stronger setting of the control-rod stop reduces the delivery. However, the other deliveries (full load and starting) must not change.





If the governor has a bearing pin with travel memory, adjust as follows.

Drive injection-pump assembly at the speed for adjusting the full-load delivery. Press control lever until it touches the full-load delivery stop screw. Read off control-rod travel. Loosen full-load delivery stop screw lock nut and turn until full-load control-rod travel has increased by 0.3 ... 0.5 mm. Retighten lock nut. Install spring-loaded control-rod stop and adjust so that the old, 0.3...0.5 mm smaller full-load control-rod travel is again obtained.

The note on this special adjustment is under "Remarks" in the test-specification sheet.

15. Adjusting the starting fuel delivery/starting control-rod travel 6

When adjusting/checking the starting fuel delivery or starting control-rod travel, take into account whether there is any special starting equipment on the governor.

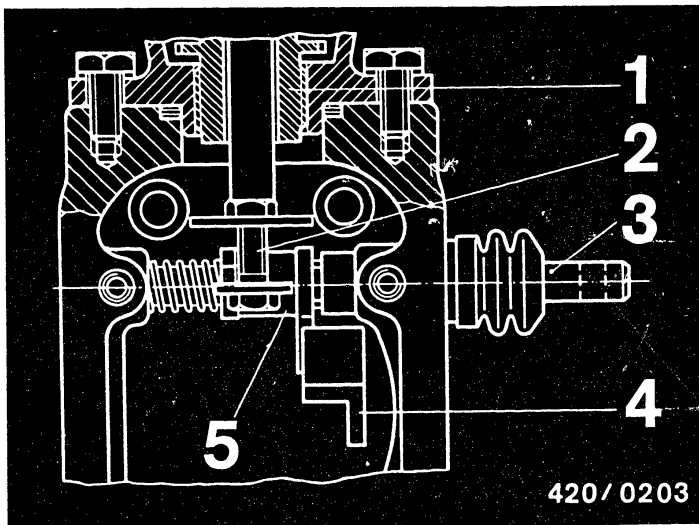
In the case of governors with a vertically mounted manifold-pressure compensator, there may be a mechanical or electromagnetic or hydraulic starting fuel delivery cancelling device.

Caution:

If there is any extra equipment for controlling the starting fuel delivery, check that the equipment is correctly installed:

Through mechanical, electrical or hydraulic triggering and simultaneous swivelling of the control lever from "SHUTOFF" to "MAX", the starting fuel delivery must be obtained. When the control lever is taken back, the control rod must latch in the full-load position.





- 1 = Ratchet nut  
 2 = Stop screw  
 3 = Starting fuel delivery  
     pushbutton

- 4 = Control rod  
 5 = Bell crank

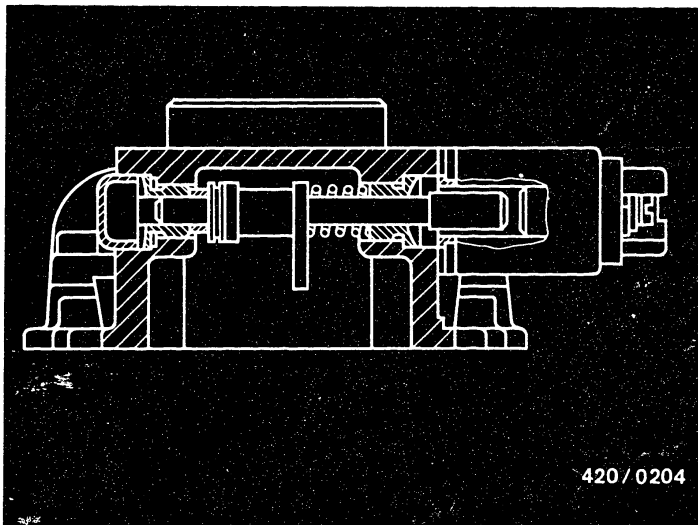
#### Starting device with pushbutton

Set the speed. Control lever from "SHUTOFF" to "MAX".  
 Press pushbutton and measure delivery.

**D15**

Adjusting the starting delivery/CRT  
 RQ governors





Starting fuel delivery with electromagnetic change-over

Set the speed. Control lever from "SHUTOFF" to "MAX". Briefly switch on magnet (12 or 24 V) and measure delivery.

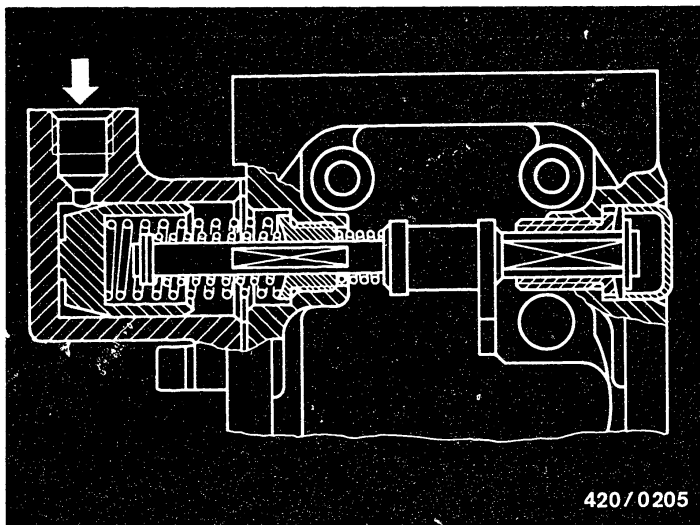
Caution:

Switch on magnet only briefly since it is only necessary to unlatch.

**D 16**

Adjusting the starting delivery/CRT  
RQ governors



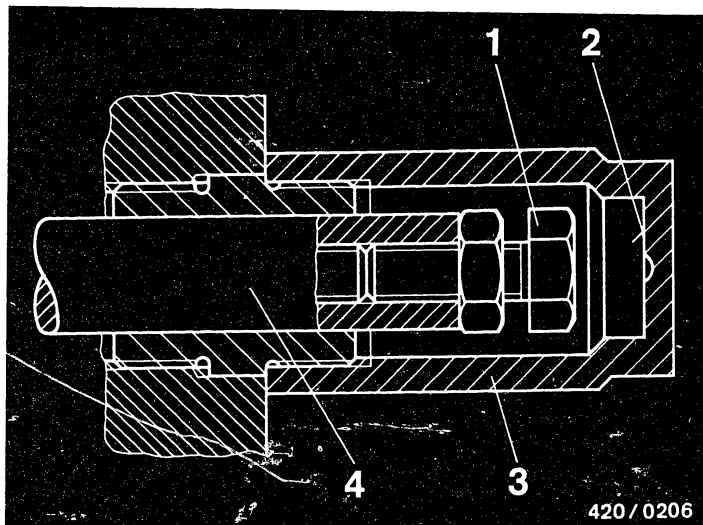


### Starting fuel delivery with hydraulic change-over

Leave stop on governor housing and connect port (arrow) to inlet line of test bench. Set the specified pressure at the test bench control valve:

At maximum pressure and  $n = 0 \text{ min}^{-1}$ , control lever from "SHUTOFF" to "MAX". Full-load position must be obtained.

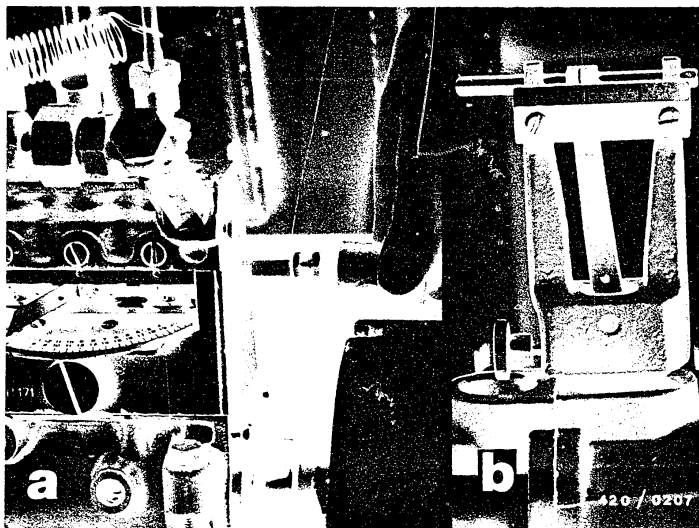
At minimum pressure and  $n = 0 \text{ min}^{-1}$ , control lever from "SHUTOFF" to "MAX". Starting position must be obtained.



1 = Adjusting screw  
2 = Stop face

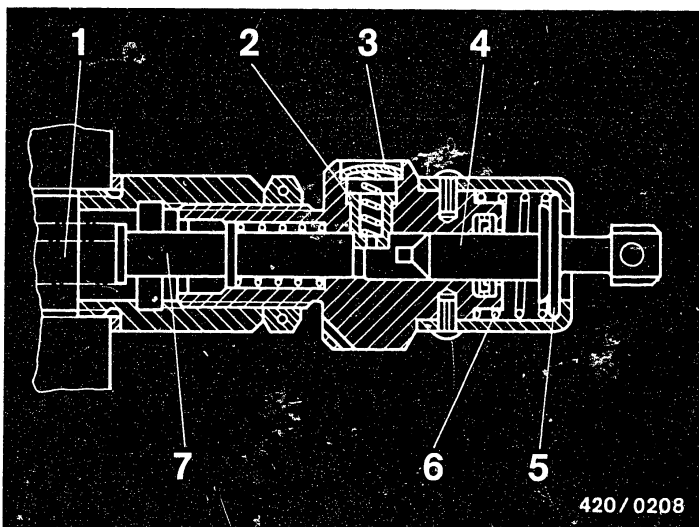
3 = Closure cap  
4 = Control rod

Drive injection-pump assembly at specified speed. Remove control-rod travel measuring device if a control-rod stop is mounted at the drive end for adjusting the starting fuel delivery/starting control-rod travel. The starting control-rod travel/starting fuel delivery is adjusted by appropriately screwing in the adjusting screw (1) into the control rod and screwing on the closure cap.



If only the starting control-rod travel is given in the test specifications, measuring is performed with control rod travel measuring device 0 681 440 009 (PE..A..) (picture a) or 1 688 130 079 (PE..P., PE..MW..) (picture b).





1 = Control rod  
2 = Locking bushing  
3 = Plug  
4 = Release pin

5 = Tilting disc  
6 = Helical spring  
7 = Stop pin

Operate pushbutton/pull-knob for starting fuel delivery. Move control lever from "SHUTOFF" to "MAX", checking the control rod for freedom of movement. Control lever at full-load stop. Press pushbutton/pull knob: The stated control-rod travel or the required starting fuel delivery must be obtained.

When the control lever is taken back to "SHUTOFF" and again moved forward, only the full-load position may now be obtained. If the specified values are not obtained, the control-rod stop must be appropriately re-adjusted.

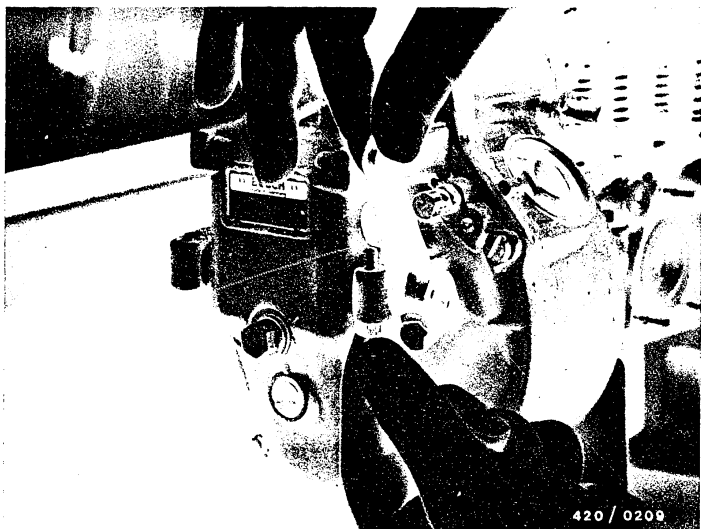
If the measurement/adjustment of the high/low idle is specified in the test specifications, the pump is driven at the specified speed and the corresponding delivery/control-rod travel is measured.

If the shutoff stop screw is used as the idle stop for the control lever, there is a corresponding note under "Remarks".

Checking the freedom of movement:

Hold control lever in idle position. Drive pump at idle speed and read off control-rod travel. When the control rod is moved by hand to "MAX" and to "SHUTOFF", it must spring back to the starting point when released ( $\pm 0.2$  mm).





#### 16. Adjusting the shutoff stop

The shutoff stop screw is adjusted to 0.5 mm control-rod travel before "SHUTOFF".

Tighten lock nut.



## 17. Final operations

### Sealing

Tighten screws and lock nuts. Observe tightening torques.

Lock and seal stop screws with paint or wire. (If the method of locking the screws was identifiable when the pump was received, use the same method of locking).

Affix repair stamp and stamp on workshop code.

### Caution:

The repair stamp and the workshop code must be renewed each time the full-load delivery and/or full-load speed are (subsequently) changed.

Remove injection-pump assembly from injection-pump test bench. Mount supply pump and, if necessary, timing device.



Leak test on camshaft chamber, spring chamber and governor chamber

Compressed air is required for the leak test. Introduce into pump camshaft chamber at a suitable point (e.g. oil inspection bore).

Immerse injection pump vertically into test bath.

Test duration and test pressure:

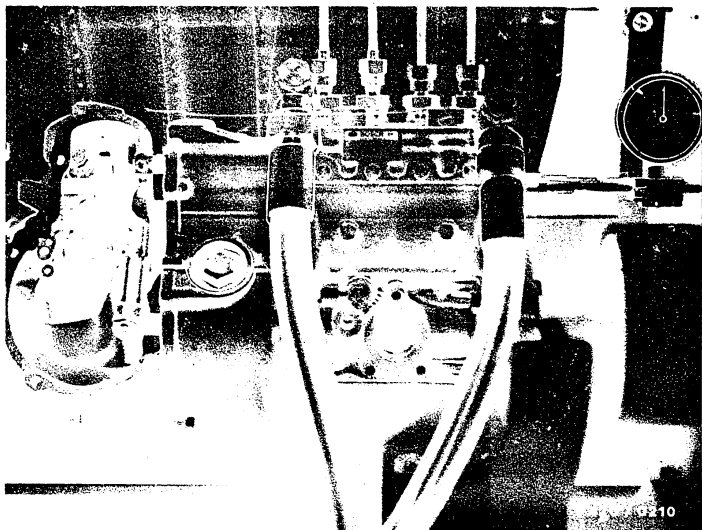
A and MW pumps: 3 min. at 1.5 bar, then  
1 min. at 0.5 bar

P pumps: 7 min. at 1.5 bar, then  
1 min. at 0.5 bar

Then visually examine whether there are any leaks at joints, screw connections, seal rings and end covers on housing and cover.

To prevent possible skin rashes, grease hands beforehand with protective skin cream and wash with soap and water after testing is completed.





### ADJUSTING RQV GOVERNORS

#### 18. Measuring the sleeve travel 1

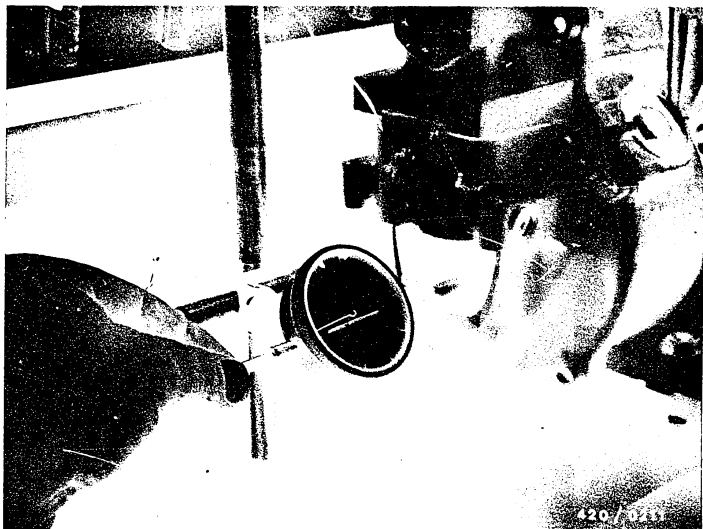
Remove full-load stop (manifold-pressure compensator) and governor cover. Remove escaping lubricating oil. Mount control-rod travel measuring device. Clamp control rod at approx. 9 mm control-rod travel. As protection, mount a provisional governor cover which has been cut out.

Pour in lubricating oil.

**E1**

Measuring the sleeve travel  
RQV governors



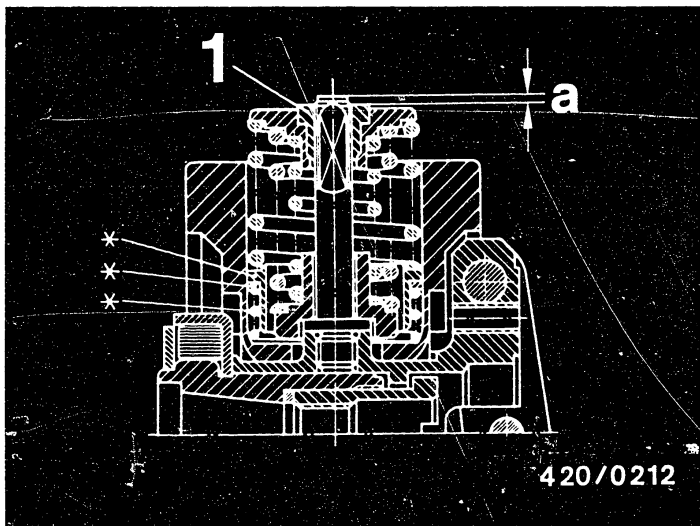


The sleeve travel as per test-specification sheet can be measured with the universal control-rod travel measuring device 1 688 130 095.

The magnetic flux of the dial indicator is applied to the slider. At  $n = 0 \text{ min}^{-1}$ , preload dial indicator by approx. 20 mm. Equalize the governor play by pulling lightly on the dial indicator spindle.

Set scale of dial indicator to "0".





a = Projection of threaded pin from adjusting nut

\* additional components on governors with double idle springs.

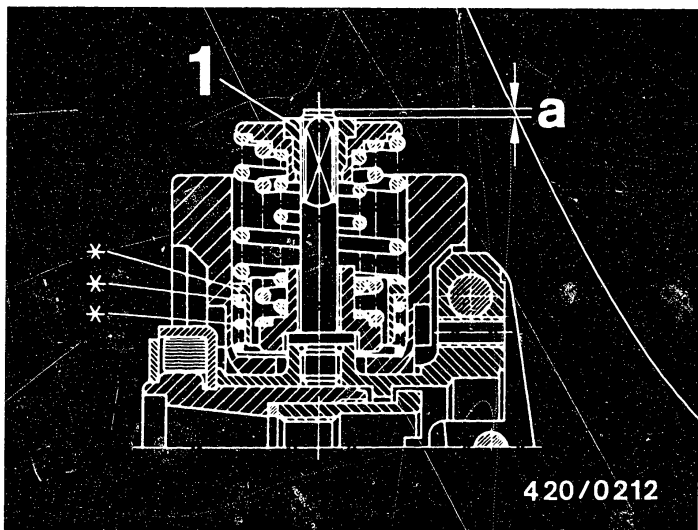
1 = Adjusting nut

Before measuring the flyweight travels, the projection "a" must be preset to 1 mm on both flyweights. Drive pump at speeds given in test-specification sheet. Read off sleeve travels and compare with those in test-specification sheet. If the specified values are not obtained, the preload of the flyweight springs must be changed by turning the adjusting nut 1 accordingly. Tensioning springs results in smaller sleeve travel (go for upper tolerance). But the threaded pins of the flyweights may be only flush or project by max. 2.5 mm. Tension governor springs uniformly on both sides (one notch difference allowable; max. 6 notches if notches finely stepped).

**E3**

Measuring the sleeve travel  
RQV governors





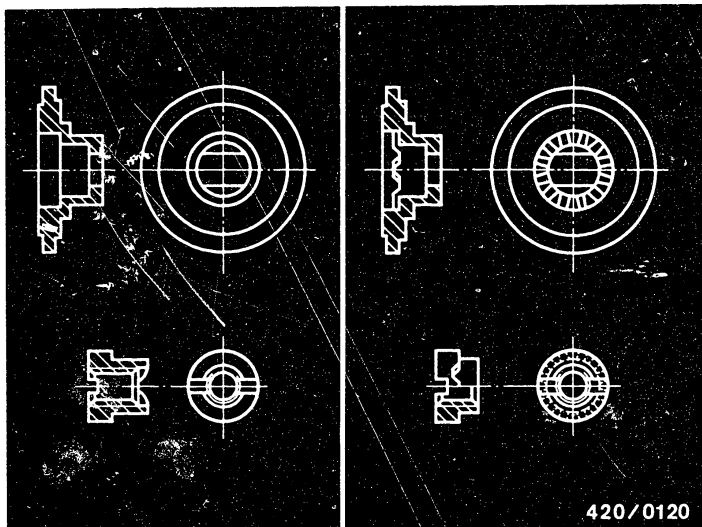
a = Projection of threaded pin from adjusting nut

Tensioning springs results in smaller sleeve travel (go for upper tolerance). But the threaded pins of the flyweights may be only flush or project by max. 2.5 mm. Tension governor springs uniformly on both sides (one notch difference allowable; max. 6 notches if notches finely stepped).

**E4**

Measuring the sleeve travel  
RQV governors





Old

New  
(Finely stepped)

Spring seat 1 420 520 002

2 420 520 001

Spring seat 1 420 520 003

2 420 520 002

Round nut 1 423 345 020

2 423 345 005

Note on adjusting:

To restrict play and to increase the accuracy of adjusting, the upper spring seat and the round nut have been provided with finely stepped notches.

Old and new versions must not be installed together.

Always make sure that spring seat and round nut are of the same version.

**E5**

Measuring the sleeve travel  
RQV governors



Remove universal control-rod travel measuring device  
1 688 130 095 and remove governor cover with cutout.  
Catch escaping lubricating oil.

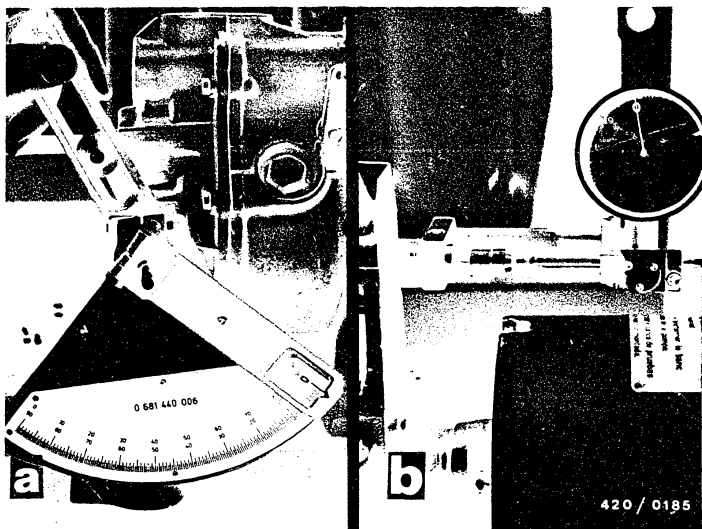
Loosen clamping screw on control-rod travel measuring  
device.

When the control rod is up against the mechanical shutoff  
stop, set the control-rod travel dial indicator to "0".

Put on governor cover with seal. Introduce longer part  
of guide block upward into coulisse.

Lock slider guide screw with Loctite CVV.





### 19. Measuring and adjusting the sleeve position 1a

Mount governor setting device 0 681 440 006. Bring control lever into shutoff position and, from this position, return slowly toward "MAX". Watch control-rod travel dial indicator. When the governor control lever is moved, as soon as the control-rod travel dial indicator indicates that the control rod is also moving, set the scale of setting device 0 681 440 006 to 0°.



Drive the injection-pump assembly at the specified speed. Move control lever toward "MAX" until the specified control-rod travel is obtained. Read off position of control lever on setting device 0 681 440 006 and compare with the value given in the test-specification sheet.

**E8**

Measuring the sleeve position  
RQV governors

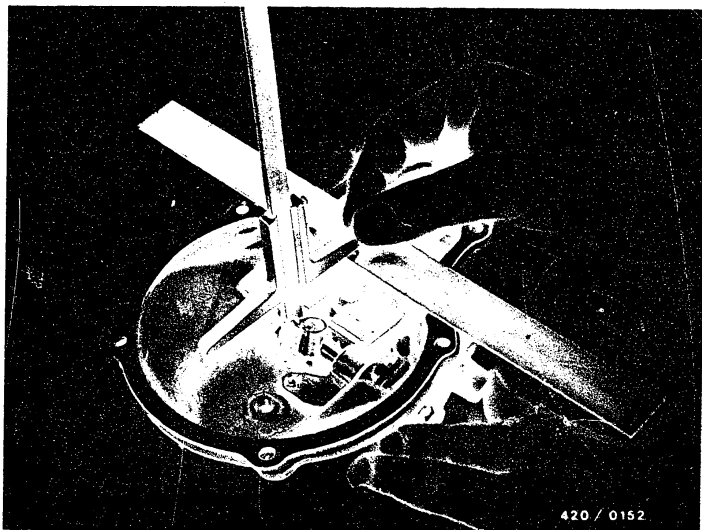


If the specified angle position is not obtained, remove governor cover.

Minor deviations from the test specification can be corrected at the cam plate of the governor cover.

0.15 mm shim thickness at the cam plate provides approx. 1 mm change in control-rod travel.





Measuring up the cam plate:

Move over the control lever so that stop screw is not in contract.

Control lever to "MAX". The pilot of the linkage lever is up against the end of the cam path.

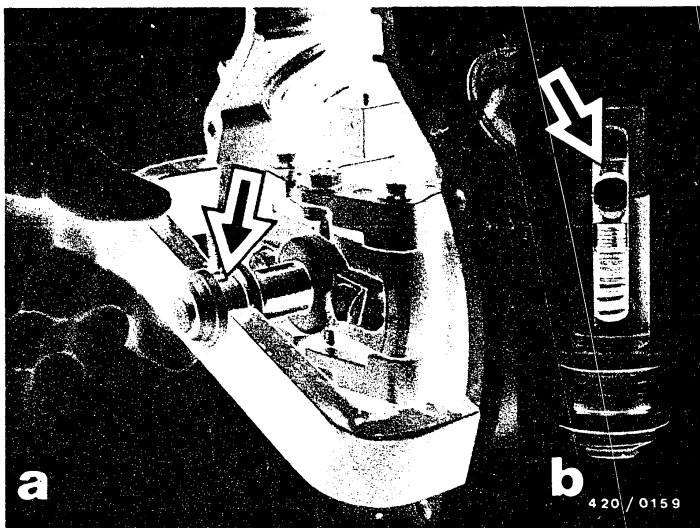
Put on seal and straightedge.

Test specification from seal on cover to center of pilot =  $24.5 \pm 0.1$  mm.

**E10**

Measuring the sleeve position  
RQV governors





In case of major deviations from the test specification, remove fulcrum lever and slider, and check sleeve position with measuring shackle 1 682 329 038.

Pull on sliding bolt so that the flyweights make contact on the inside (do not over-compress sliding bolt spring).

In this position, the measuring shackle should engage the slider guide (picture a-arrow).

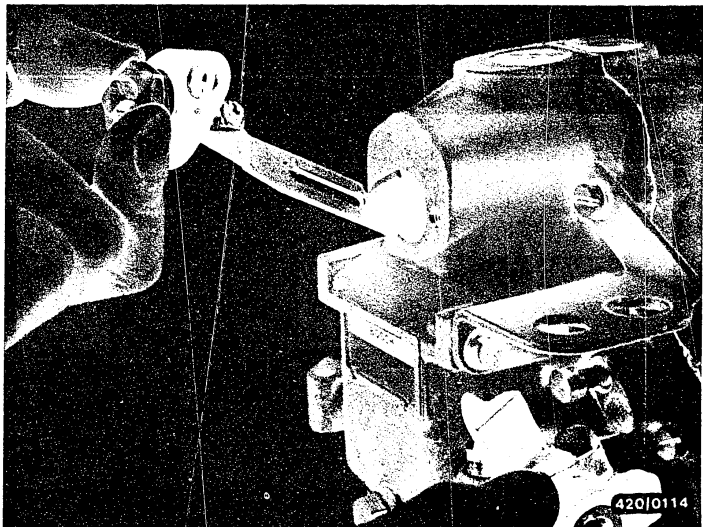
Adjustment is performed by turning the adjusting screw with the sliding bolt removed (picture b).

1/2 turn at the sliding bolt provides approx. 2.25 mm change in control-rod travel. After adjusting, re-assemble governor and screw down governor cover.

**E11**

Measuring the sleeve position  
RQV governors





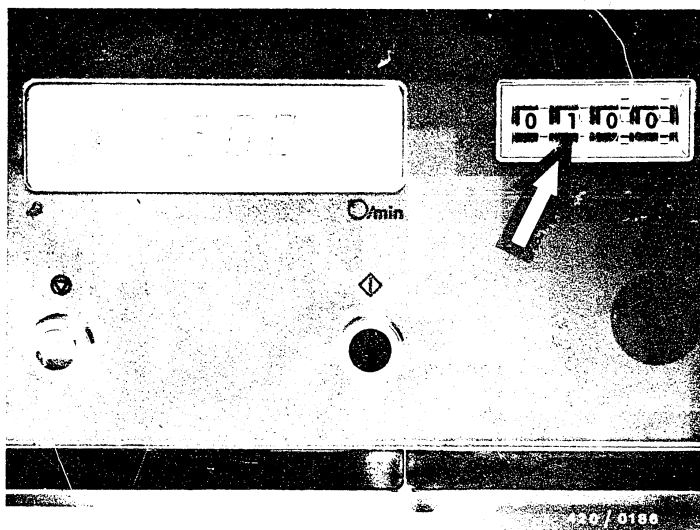
## 20. Mounting the full-load stop

When introducing, make sure that the strap points down until you have got past the fulcrum lever. Then raise the strap and hook into the guide pin of the rocker arm.

**E12**

Mounting the full-load stop  
RQV governors



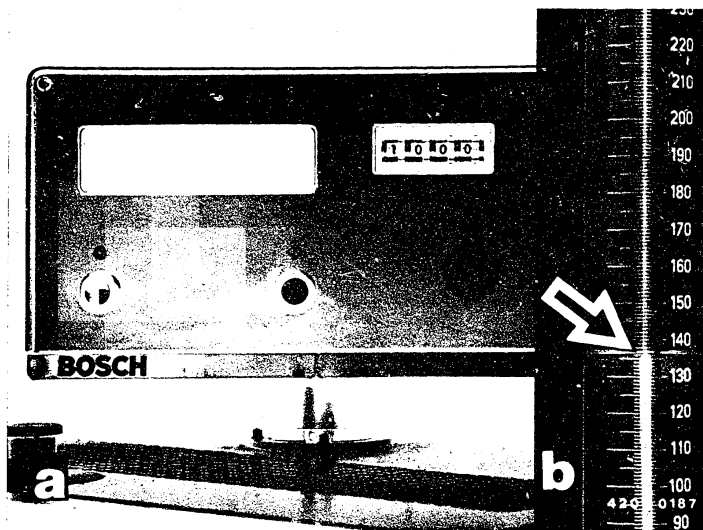


## 21. Adjusting the full-load delivery

Governors without manifold-pressure compensator 2

Drive injection-pump assembly at specified speed. Set stroke counter to "100" and switch on. The quantity of calibrating oil which is caught in the measuring glasses of the test bench is used in the first measurement not for measuring the fuel delivery, but for wetting the measuring glasses. The measuring glasses are again emptied. The discharge time is 29 to 31 seconds. If the pause after discharging is longer than 10 minutes, wet measuring glasses again.





Set stroke counter to "1000" and trigger. After the stroke counter has completed the measurement, read off the quantity of calibrating oil in each measuring glass and note down.

A blue stripe, which is opposite the numbering on the measuring glass, is used for an accurate reading of the quantity of calibrating oil in the measuring glass. If the measuring glass is wetted, light refraction at the surface of the liquid results in two superimposed points. Always read off the fuel delivery at the scale mark indicated by the two points.



The fuel delivery given in the test specifications is the average of all individual deliveries measured. Also establish whether the allowable dispersion given in the test specifications is exceeded. The dispersion indicates the difference between the largest and the smallest fuel deliveries.

#### Example

Specified delivery = 121...123 cm<sup>3</sup>/1000 strokes

Allowable dispersion = 3 cm<sup>3</sup>/1000 strokes

#### Measurement 1

Cylinder No.	1	2	3	4	5	6	Average
Delivery	124	122	125	123	125	124	123.8

Dispersion: 125-122 = 3 cm<sup>3</sup>/1000 strokes

This setting is not allowable; the average of all cylinders is not between 121 and 123 cm<sup>3</sup>/1000 strokes.

#### Measurement 2

Cylinder No.	1	2	3	4	5	6	Average
Delivery	124	122	120	123	121	124	122.3

Dispersion: 124-120 = 4 cm<sup>3</sup>/1000 strokes

This setting is likewise not allowable; the dispersion is greater than 3 cm<sup>3</sup>/1000 strokes.



### Measurement 3

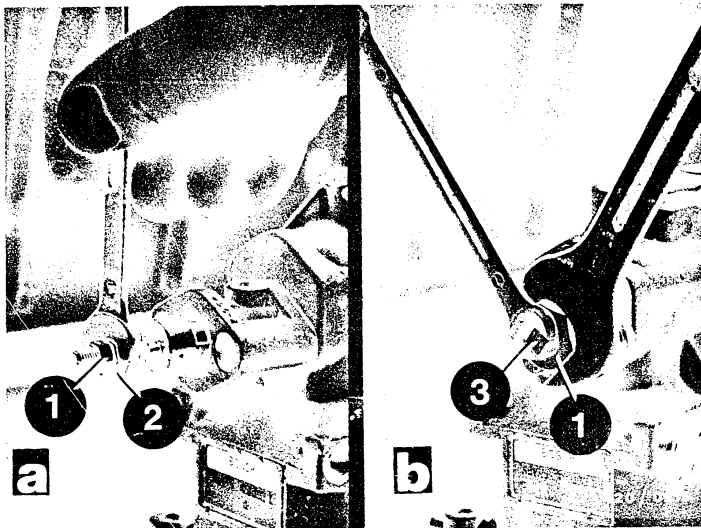
Cylinder No.	1	2	3	4	5	6	Average
Delivery	124	122	122	123	121	124	122.6

Dispersion:  $124 - 121 = 3 \text{ cm}^3/1000 \text{ strokes}$

This setting is allowable

Figures in parentheses apply only when checking a pump, not when resetting it.





If the measured full-load delivery does not agree with the test specification, proceed as follows:

Loosen full-load stop lock nut (1).

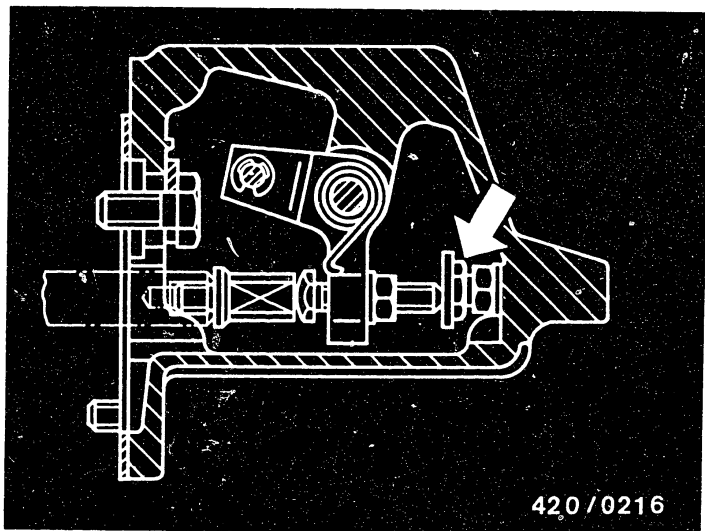
Depending on the version of stop, turn either the adjusting nut (2) or the square-head bolt (3) until the specified full-load delivery is obtained by further measurements.

Tighten the lock nut (1) before each measurement.

**F5**

Adjusting the full-load delivery  
RQV governors





Governors with reamed manifold-pressure compensator

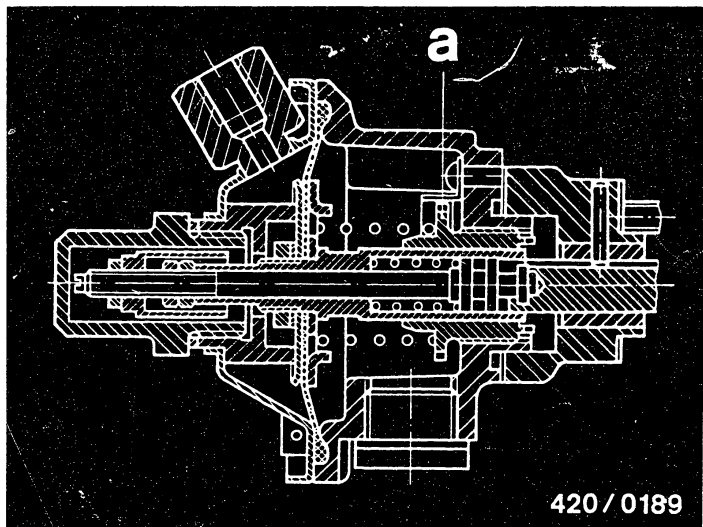
The full-load delivery is adjusted at the corresponding adjusting screw (arrow).

After each adjustment, tighten the lock nut.

**F6**

Adjusting the full-load delivery  
RQV governors





420 / 0189

Mount manifold-pressure compensator according to installation position.

If the manifold-pressure compensator is mounted at the drive end, mount control-rod-travel measuring device 1 687 130 130 with accessories 1 687 000 061, and set the dial indicator to "0" with the control rod in the shutoff position.

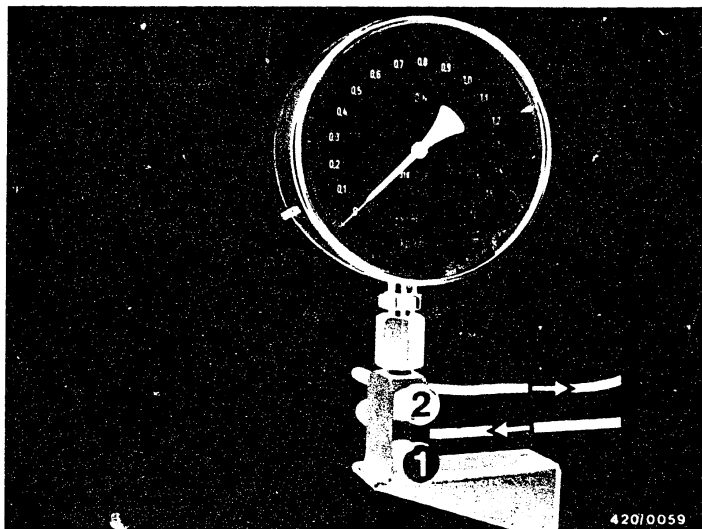
Mount compressed-air supply on manifold-pressure compensator as specified.

Fully relax the manifold-pressure compensator spring by screwing back the adjusting screw (a).

**F7**

Adjusting the full-load delivery  
RQV governors





Adjusting screw 1 (bottom) for adjusting the pressure.  
Screw plug 2 (top) for leak test on diaphragm chamber.

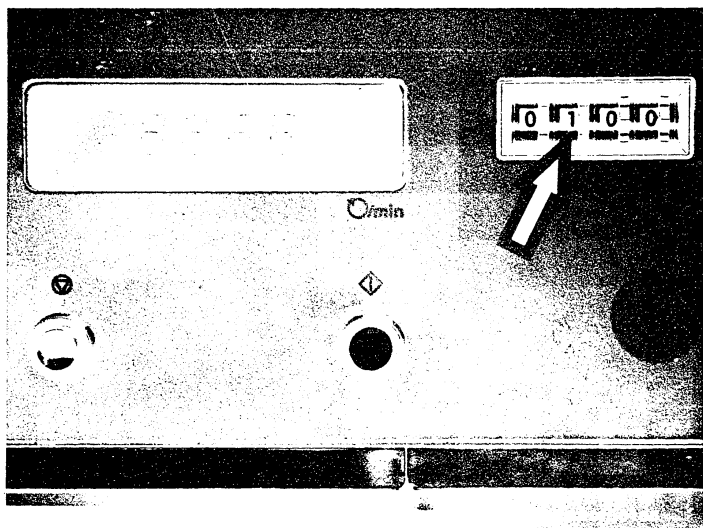
#### Connection of manifold-pressure compensator

Establish connection between pressure regulator and bottom connection of adjustment throttle. Connect manifold-pressure compensator to the top connection of the adjustment throttle.

**F8**

Adjusting the full-load delivery  
RQV governors





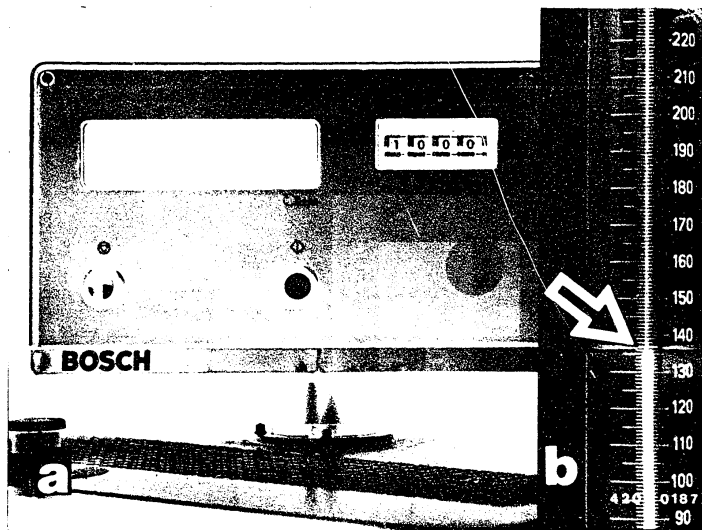
### Governors with manifold-pressure compensator 2

Apply the specified charge-air pressure to the manifold-pressure compensator. Drive injection-pump assembly at specified speed. Set stroke counter to "100" and switch on. The quantity of calibrating oil which is caught in the measuring glasses of the test bench is used in the first measurement not for measuring the fuel delivery, but for wetting the measuring glasses. The measuring glasses are again emptied. The discharge time is 29 to 31 seconds. If the pause after discharging is longer than 10 minutes, wet measuring glasses again.

**F9**

Adjusting the full-load delivery  
RQV governors





Set stroke counter to "1000" and trigger. After the stroke counter has completed the measurement, read off the quantity of calibrating oil in each measuring glass and note down.

A blue stripe, which is opposite the numbering on the measuring glass, is used for an accurate reading of the quantity of calibrating oil in the measuring glass. If the measuring glass is wetted, light refraction at the surface of the liquid results in two superimposed points. Always read off the fuel delivery at the scale mark indicated by the two points.

**F10**

Adjusting the full-load delivery  
RQV governors



The fuel delivery given in the test specifications is the average of all individual deliveries measured. Also establish whether the allowable dispersion given in the test specifications is exceeded. The dispersion indicates the difference between the largest and the smallest fuel deliveries.

#### Example

Specified delivery = 121...123 cm<sup>3</sup>/1000 strokes

Allowable dispersion = 3 cm<sup>3</sup>/1000 strokes

#### Measurement 1

Cylinder No.	1	2	3	4	5	6	Average
Delivery	124	122	125	123	125	124	123.8

Dispersion: 124-122 = 3 cm<sup>3</sup>/1000 strokes

This setting is not allowable; the average of all cylinders is not between 121 and 123 cm<sup>3</sup>/1000 strokes.

#### Measurement 2

Cylinder No.	1	2	3	4	5	6	Average
Delivery	124	122	120	123	121	124	122.3

Dispersion: 124-120 = 4 cm<sup>3</sup>/1000 strokes

This setting is likewise not allowable; the dispersion is greater than 3 cm<sup>3</sup>/1000 strokes.



### Measurement 3

Cylinder No.	1	2	3	4	5	6	Average
Delivery	124	122	122	123	121	124	122.6

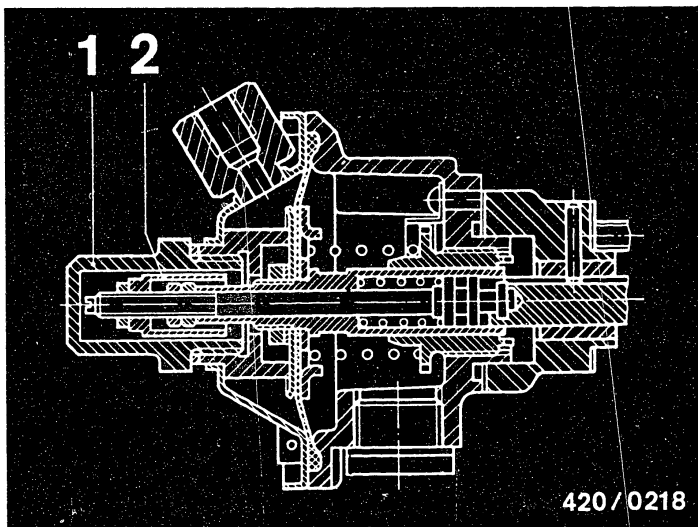
Dispersion:  $124 - 121 = 3 \text{ cm}^3/1000 \text{ strokes}$

This setting is allowable.

Figures in parentheses apply only when checking a pump, not when resetting it.

If the measured full-load delivery does not agree with the test specification, adjust the delivery in accordance with the version of manifold-pressure compensator and its installation position.





Adjustment on horizontally mounted manifold-pressure compensator (older version)

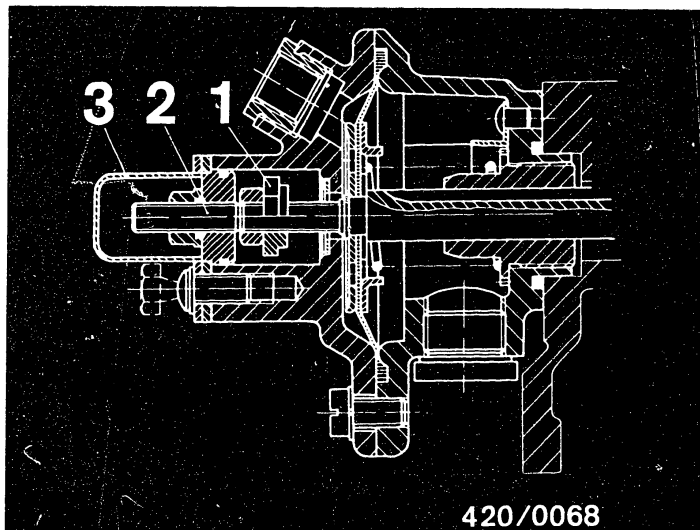
Set full-load delivery for turbocharged operation (max. charge-air pressure) with sleeve (2) and nut.

For this test, the cap (1) must be mounted with seal so that the pressure cannot escape.

**F13**

Adjusting the full-load delivery  
RQV governors





Adjustment on horizontally mounted manifold-pressure compensator (standard manifold-pressure compensator)

The full-load delivery at maximum charge-air pressure is adjusted at the nut (1) of the manifold-pressure compensator using socket wrench set KDEP 1047.

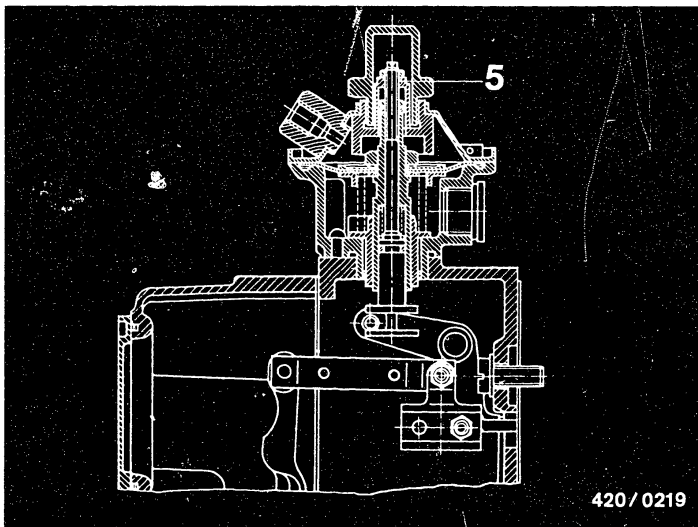
Items 2 and 3 in the picture are removed for this. But remount after the full-load delivery has been adjusted.

**F14**

Adjusting the full-load delivery

RQV governors





420 / 0219

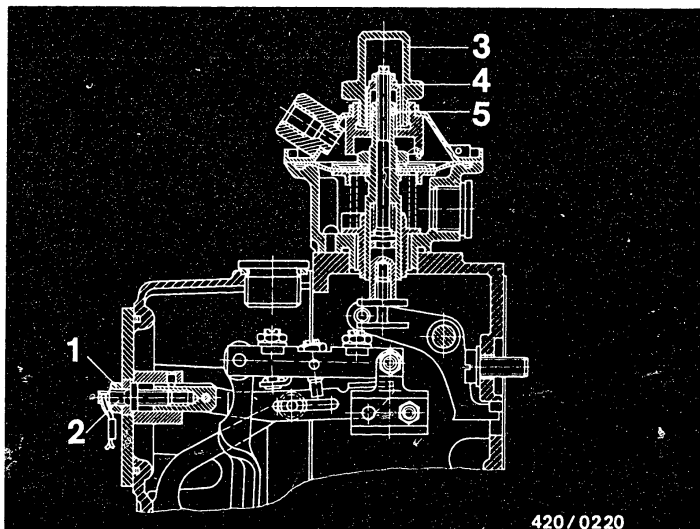
Adjustment on vertically mounted manifold-pressure compensator

In governors without a full-load stop on the governor cover, the full-load delivery with charge-air pressure is adjusted at sleeve 5.

**F15**

Adjusting the full-load delivery  
RQV governors





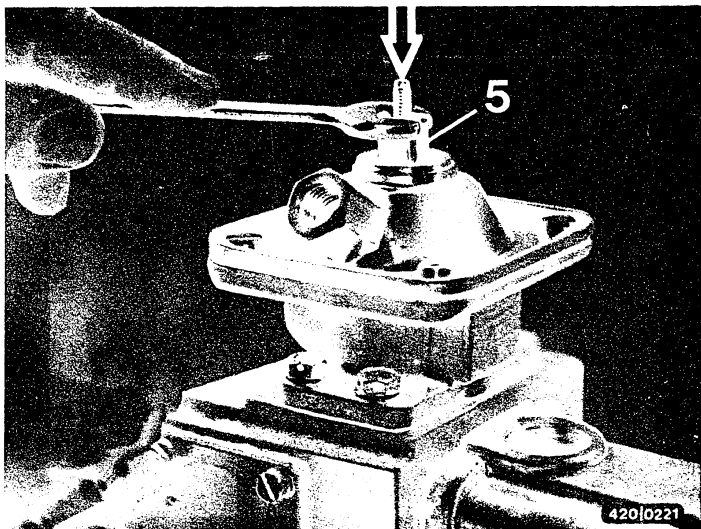
420 / 0220

In governors with a full-load stop on the governor cover, unscrew closure cap (3) and adjusting sleeve (5) from the manifold-pressure compensator. After loosening the lock nut (1), adjust the full-load delivery by turning the adjusting screw (2).

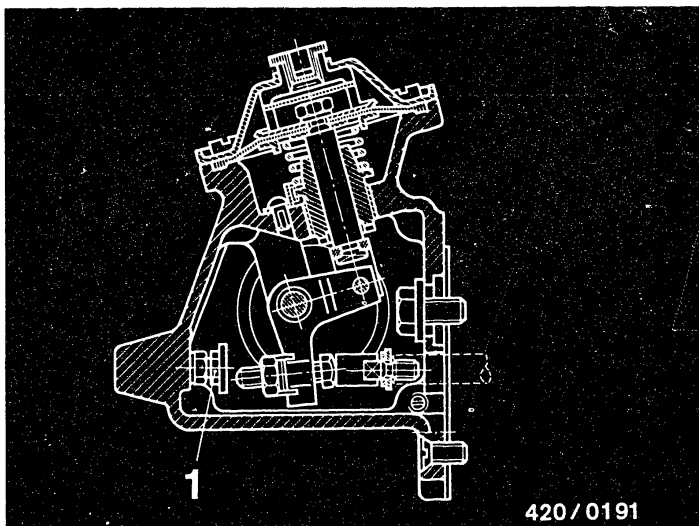
**F16**

Adjusting the full-load delivery  
RQV governors





Press on manifold-pressure compensator rod by hand (arrow). Watch dial indicator of control-rod travel measuring device. Screw on sleeve (5) until the control-rod travel changes. Then screw back sleeve (5) by two turns so that there is no intervention and thus no reduction of the already adjusted full-load delivery. Mount closure cap.



420/0191

Adjustment on manifold-pressure compensator mounted  
at drive end

Loosen lock nut of delivery adjusting screw (1) and turn  
adjusting screw until the specified full-load delivery  
is obtained.

**F18**

Adjusting the full-load delivery  
RQV governors



## 22. Setting the maximum full-load speed 2a

Set the control lever to the angle position given in the test specifications. Starting from  $0 \text{ min}^{-1}$ , raise speed until the stated control-rod travel is indicated by the control-rod travel measuring device. Read off speed. It must be within the given speed range. If not obtainable, change position of control lever: Allowable tolerance  $\pm 4^\circ$ .

Raise speed until the second control-rod travel is obtained. If agreement with the specified values is not possible, there is a fault in the transmission components of the governor. Replace defective or incorrect components with new or correct ones, respectively.



If further control-rod travels and speeds are given in the test specifications, now check these.

### Falling speed

Also in the case of falling speed, there must be a steady increase in the control-rod travel, no "stuttering", visible on the control-rod travel dial indicator.

### Checking:

The speed tolerance is not separately listed for checking. It is  $\pm 5 \text{ min}^{-1}$  in addition to the speeds given there.

Example: 1340...1350 (1335...1355)



### 23. Setting the minimum full-load speed 3

Bring the control lever into the position specified in the test specifications. Set the first specified speed and compare the control-rod travel obtained with the test specification in the test-specification sheet. If the control-rod travels (actual and specified) do not agree, change the position of the control lever. The allowable tolerance is  $\pm 4^\circ$ .

If further measuring points are given, raise the speed and compare the obtained control-rod travels with the test specifications.

If the values in the test-specification sheet are not obtained, there is a fault in the transmission components of the governor. Replace defective or incorrect components with new or correct ones, respectively.



## 24. Checking the steadiness 3a

The control-rod travel must decrease steadily within the stated speed tolerance, i.e. there must be no "step" and the control-rod travel must not stand still over a particular speed range.

If there is an ungoverned step, the max.-speed governor springs must be relaxed by taking out shims from under the springs and/or the lower spring seats must be changed.

If necessary, repeat the adjustment of the sleeve travel.



## 25. Checking the torque-control characteristic 5

Set the governor control lever to maximum deflection and hold.

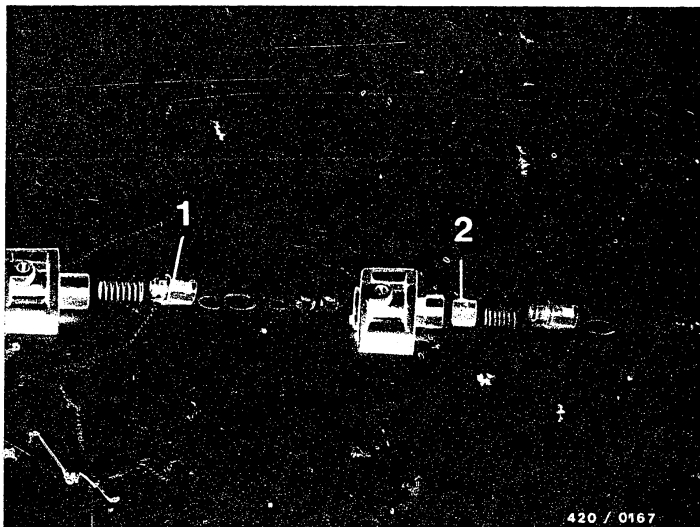
Set the 1st speed in the "TORQUE CONTROL" section and read off the control-rod travel obtained. This is the full-load control-rod travel. It serves as the starting point when measuring/setting the following control-rod travels of the torque-control characteristic.

Change speed as stated in the test specifications and read off the resulting control-rod travels. If they do not agree with the test specifications, make an adjustment according to the version of torque control.

**G1**

Check and adjust torque-control charact.  
RQV governors





### Adjusting the torque-control travel in the case of external torque control

In versions of governor with external torque control, various methods of adjustment are used for adjusting the torque-control travel.

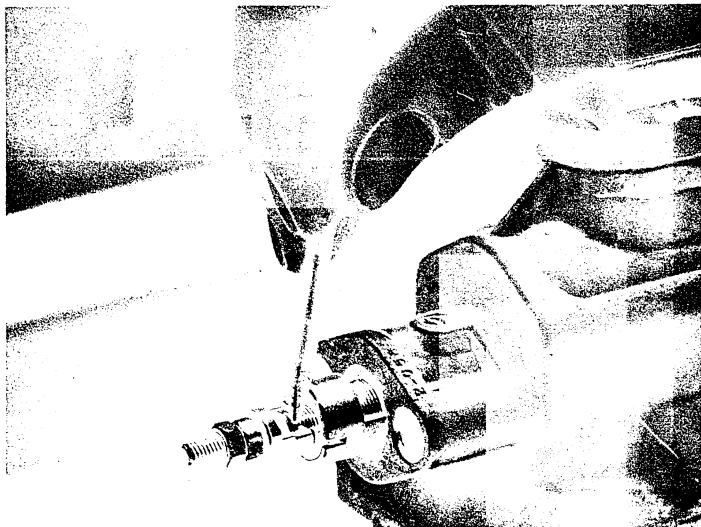
Therefore, it is necessary to adjust the torque-control travel using components from the respective service-parts list.

The torque-control travel is adjusted by:

- guide bushing with different collar thickness (1)
- threaded sleeve (2)

See the respective test-specification sheet for the torque-control travel (dimension "a").





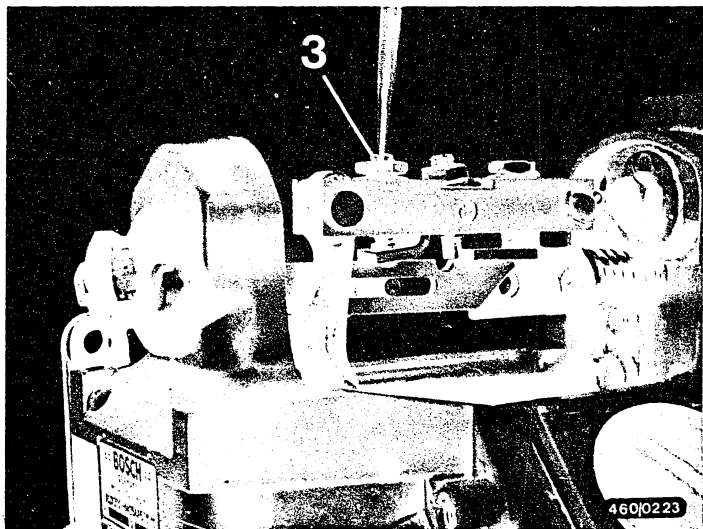
Adjustment in the case of external torque control (in full-load control-rod stop).

Set control lever to maximum deflection. Change preload of torque-control spring until the specified torque-control characteristic is obtained.

**G3**

Check and adjust torque-control charact.  
RQV governors





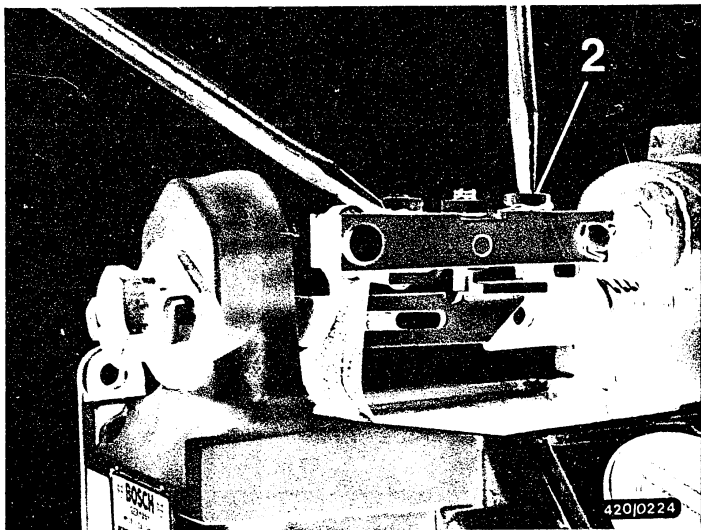
Basic adjustment in case of internal torque control  
(older version)

Preloading the torque-control spring:

Set torque-control spring adjusting screw (1) approximately flush with nut and lock.

(In the picture, the governor housing has been cut away for a better view.)

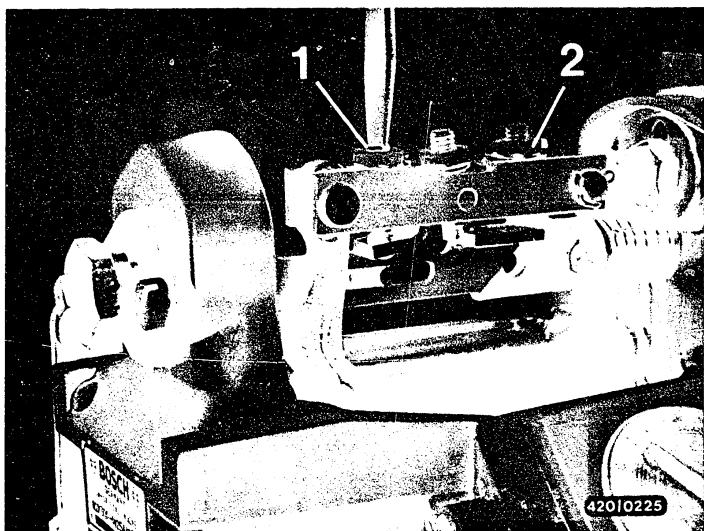




Adjusting the torque-control travel (Dimension "a"  
in the test specifications)

The difference between the maximum and minimum control-rod travel in the torque-control characteristic is the torque-control travel. If, when checking any of the stated speeds, the control-rod travel is not obtained, adjustment is made at the adjusting screw (2). After adjusting, tighten lock nut.

Setting torque-control travel "0":  
Screw torque-control travel adjusting screw (2) upward as far as it will go and lock with nut.



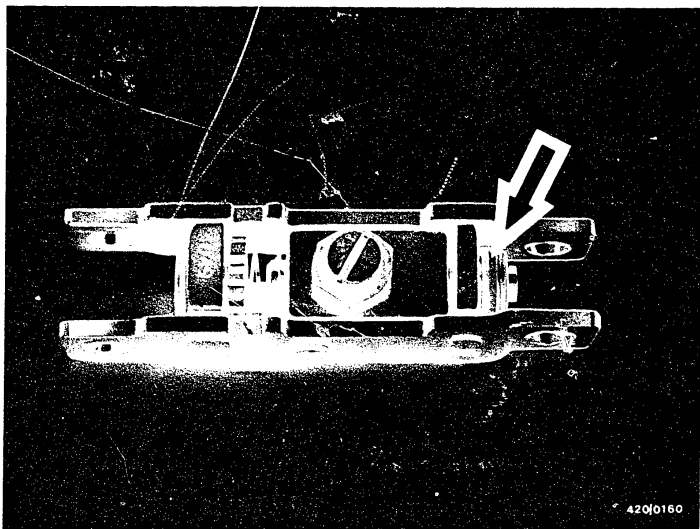
Adjusting the torque-control spring:

Turn adjusting screw (1) until torque-control characteristic as per test-specification sheet is obtained, and then lock.

**G6**

Check and adjust torque-control charact.  
RQV governors





420/0160

Adjustment in case of internal torque control  
(new version)

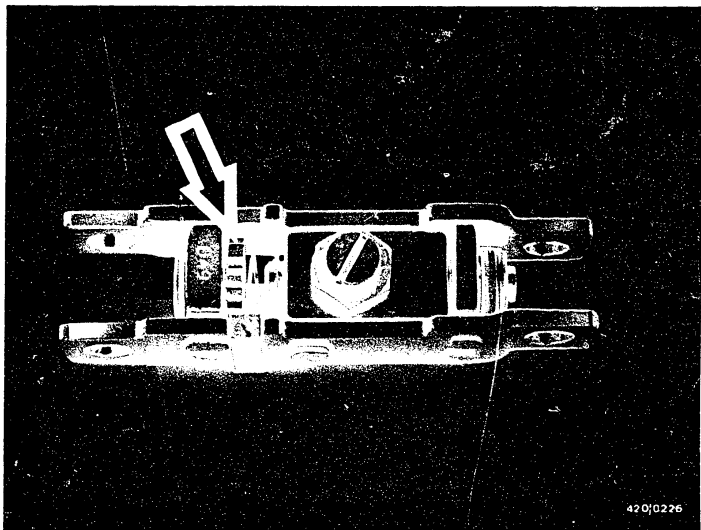
Adjusting the torque-control travel (dimension "a" in the test specifications):

The difference between the maximum and minimum control-rod travel in the torque-control characteristic is the torque-control travel. If, when checking any of the stated speeds, the torque-control travel is not obtained, adjustment is made by selecting appropriate adjusting washers (arrow).

**G7**

Check and adjust torque-control charact.  
RQV governors





420/0226

### Adjusting the torque-control spring

Turn adjusting screw (arrow) until torque-control characteristic is obtained at stated speeds as per test-specification sheet.

**G8**

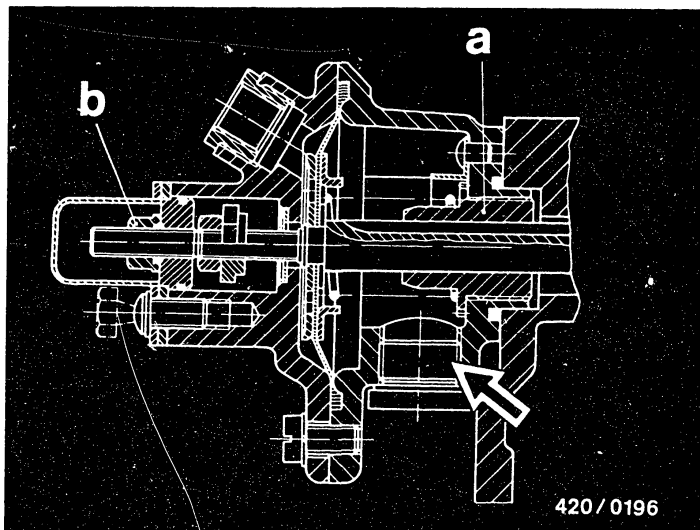
Check and adjust torque-control charact.  
RQV governors



26. Checking the adjustment of the manifold-pressure compensator

Drive the injection-pump assembly at the specified speed. The specified charge-air pressure for adjusting results in the stated control-rod travel insofar as the specified values have been complied with in the preceding adjustments. Preload the adjusting screw of the manifold-pressure compensator spring by screwing out until the control-rod travel dial indicator indicates that the control rod is beginning to move.





#### Measuring:

At the same speed, set the pressure required for measuring. Read off the control-rod travel.

If the specified pressure is given as 0 bar, the control-rod travel is adjusted at the adjusting screw (b) for the "naturally-aspirated delivery".

If the specified pressure is greater than 0 bar, set this pressure. Read off the control-rod travel obtained and adjust by changing the manifold-pressure compensator spring adjusting screw (a). As a check, the other pressures are set and the resulting control-rod travels are read off. If they do not agree with the ones given in the test specifications, the manifold-pressure compensator spring must be replaced by a new one.



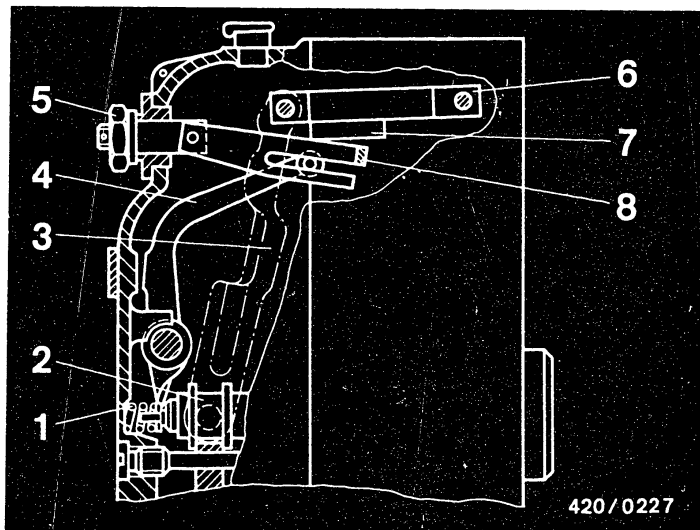
## 27. Leak test on manifold-pressure compensator

Seal all openings of the manifold-pressure compensator.  
Set 1.0 bar charge-air pressure. Close screw plug of  
adjustment throttle 1 688 130 132 and shut off air  
supply. The pressure gauge may indicate max. 0.03 bar  
pressure drop within 10 sec.

**G11**

Leak test on manifold-pressure comp.  
RQV governors





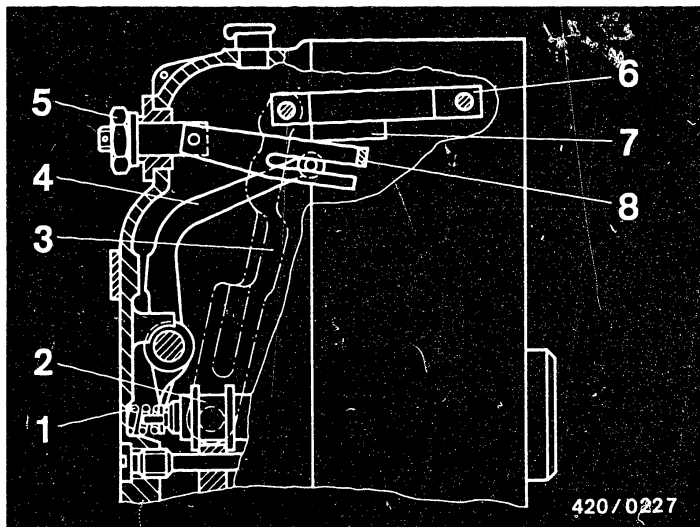
420 / 0227

- |                     |                           |
|---------------------|---------------------------|
| 1 = Helical spring  | 6 = Link fork             |
| 2 = Sliding bolt    | 7 = Stop piece            |
| 3 = Fulcrum lever   | 8 = Stop strap with lug   |
| 4 = Rocker arm      | (in bottom-most position) |
| 5 = Adjusting screw |                           |

## 28. Setting the change-over point 6

If the governor is equipped with a control-rod stop of the older version with replaceable stop screw (8), the change-over point is set by selecting the necessary stop strap.





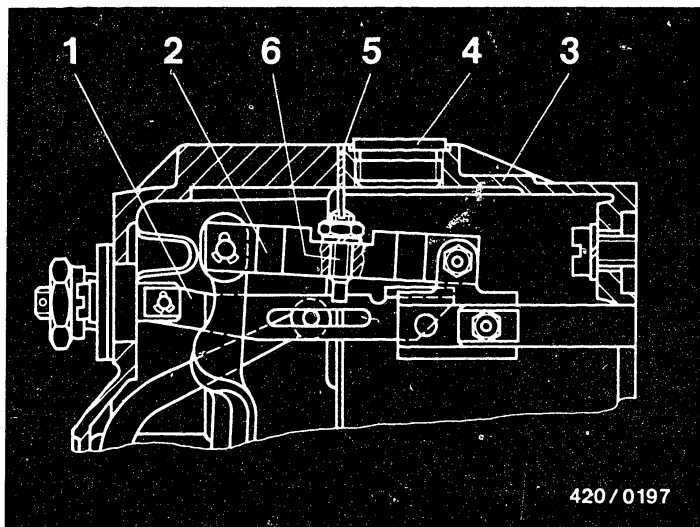
8 = Stop strap with lug (in bottom-most position)

Starting from  $0 \text{ min}^{-1}$ , slowly raise speed. the governor control lever is constantly moved from "SHUTOFF" to "MAX" and vice versa. As soon as the control rod moves only to the full-load position, the change-over speed has been reached. If the thus measured speed does not agree with the test specification, replace stop strap (8) with one with a different code number.

**G13**

Setting the change-over point  
RQV governors





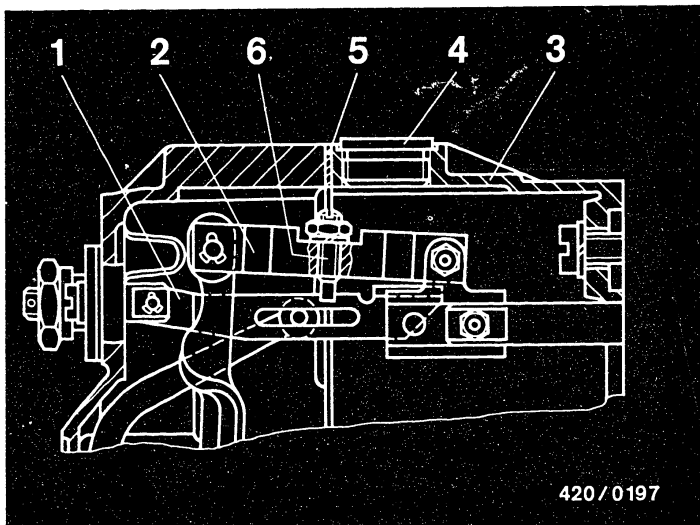
420 / 0197

1 = Stop strap  
2 = Link fork  
3 = Housing

4 = Screw plug  
5 = Seal  
6 = Adjusting screw

Setting the change-over point: 6

If the governor is equipped with the adjusting screw and strap shown in the picture, the change-over point from "START" to "FULL LOAD" is adjusted by turning the adjusting screw (6) which is accessible after removing the screw plug (4).



420/0197

6 = Adjusting screw

Starting from  $0 \text{ min}^{-1}$  slowly raise the speed. The governor control lever is constantly moved from "SHUT-OFF" to "MAX" and vice versa. As soon as the control rod moves only to the full-load position, the change-over speed has been reached. Adjustments are made at the adjusting screw (6) with a screwdriver and box wrench KDEP 1547 or KDEP 1633.

**G 15**

Adjusting the change-over point  
RQV governors



## 29. Measuring the fuel delivery characteristic: 5a

Set the control lever to maximum deflection.

Set the specified charge-air pressure (if pump has a manifold-pressure compensator). Drive pump at specified speed and measure fuel delivery. The value given in the test specifications must be obtained when resetting. The value in parentheses applies only when checking a pump.

If more than one measuring point is given for the fuel delivery characteristic, these are checked one after the other while complying with the specified charge-air pressures and speeds.

The fuel delivery given in the test specifications is the average of all individual deliveries measured. Also establish whether the allowable dispersion given in the test specifications is exceeded. The dispersion indicates the difference between the largest and the smallest fuel deliveries.

### Example

Specified delivery - 121-123 cm<sup>3</sup>/1000 strokes

Allowable dispersion = 3 cm<sup>3</sup>/1000 strokes

### Measurement 1

Cylinder No.	1	2	3	4	5	6	Average
Delivery	124	122	125	123	125	124	123.8 °

Dispersion: 125-122 = 3 cm<sup>3</sup>/1000 strokes.

This setting is not allowable; the average of all cylinders is not between 121 and 123 cm<sup>3</sup>/1000 strokes.



### Measurement 2

Cylinder No.	1	2	3	4	5	6	Average
Delivery	124	122	120	123	121	124	122.3

Dispersion:  $124 - 120 = 4 \text{ cm}^3/1000 \text{ strokes}$

This setting is likewise not allowable; the dispersion is greater than  $3 \text{ cm}^3/1000 \text{ strokes}$ .

### Measurement 3

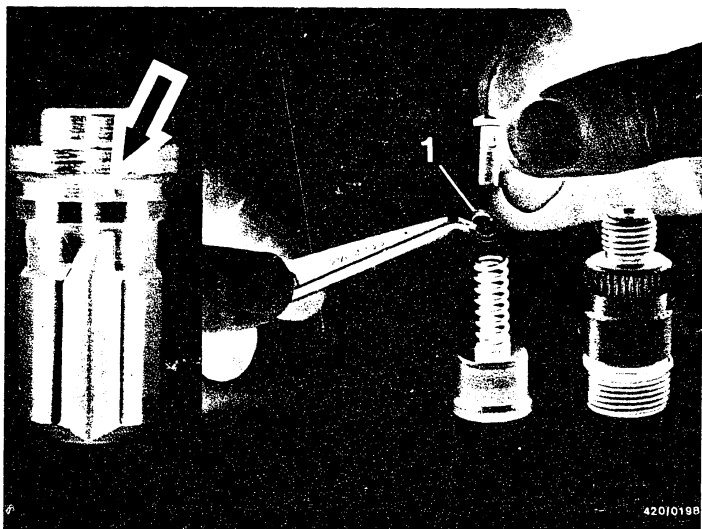
Cylinder No.	1	2	3	4	5	6	Average
Delivery	124	122	122	123	121	124	122.6

Dispersion:  $124 - 121 = 3 \text{ cm}^3/1000 \text{ strokes}$

This setting is allowable.

If the specified fuel deliveries are not obtained at the specified speeds and charge-air pressures, it is possible to obtain the corresponding values by changing the torque control.





### Adjustment in the case of torque-control delivery valves

Torque-control delivery valves can be identified by the small bore (arrow) between sealing cone and retraction collar of the valve cone.

If the specified values for the fuel delivery characteristic are not obtained, set the specified fuel delivery characteristic by selecting appropriately thick shim (1) between valve spring and filler piece.

Measure the "naturally-aspirated delivery" at charge-air pressure of 0 mbar and at the specified speed.

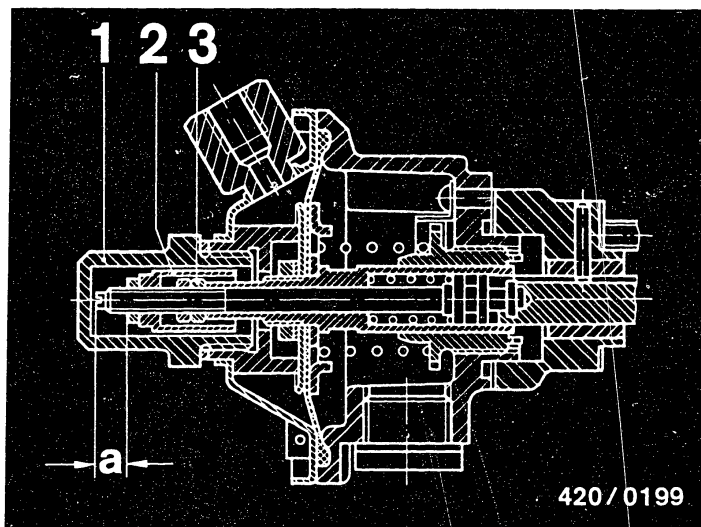
If the measured fuel delivery does not agree with that in the test-specification sheet, an adjustment is made at the corresponding adjusting screw or adjusting nut, depending on the version of manifold-pressure compensator.

**G 19**

Measuring the fuel-deliv. characteristic

RQV governors



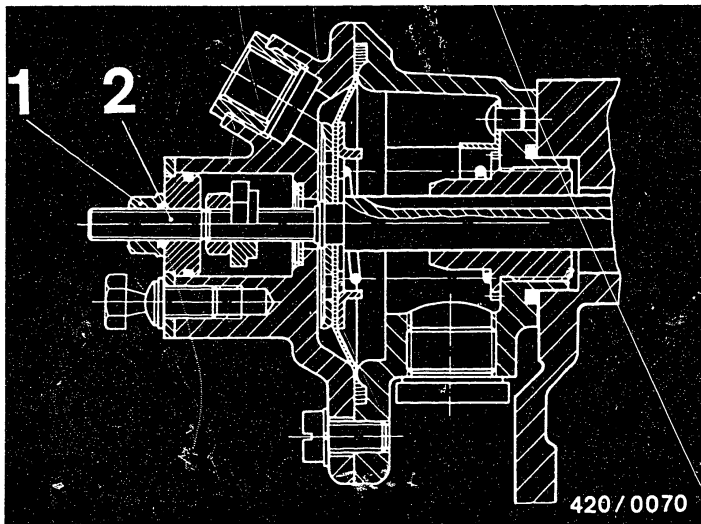


420 / 0199

Adjustment of fuel delivery at 0 mbar charge-air pressure (naturally-aspirated delivery) on manifold-pressure compensators of older type (mounted horizontally or vertically).

After unscrewing the cap (1), measure dimension "a" and note down. Unscrew adjusting sleeve (2) and set full-load delivery for naturally-aspirated operation at 0 bar at the nuts (3).

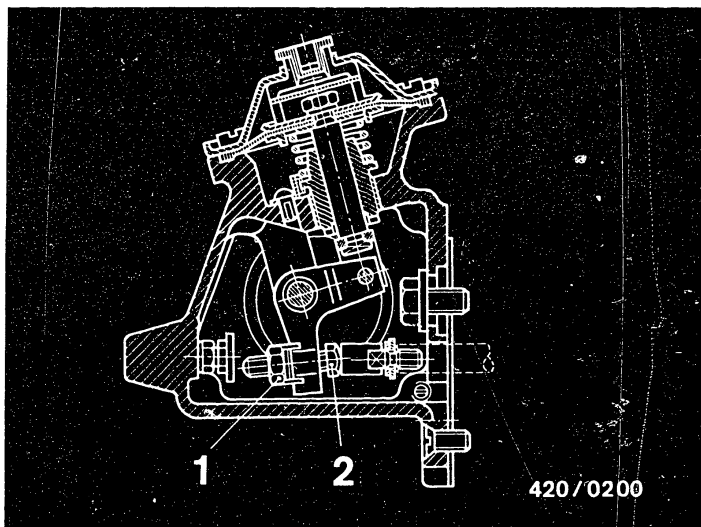
When assembling, reset dimension "a" and check full-load delivery with charge-air pressure. If necessary, correct by turning the sleeve (2).



Adjustment of fuel delivery at 0 mbar charge-air pressure (naturally-aspirated delivery) on manifold-pressure compensators of new type (standard manifold-pressure compensator, mounted horizontally or vertically).

After taking off the closure cap of the manifold-pressure compensator, loosen hexagon nut (1) with adjusting tool KDEP 1048 and set the fuel delivery at the threaded pin (2).

After adjustment is completed, tighten the hexagon nut and re-mount the closure cap.

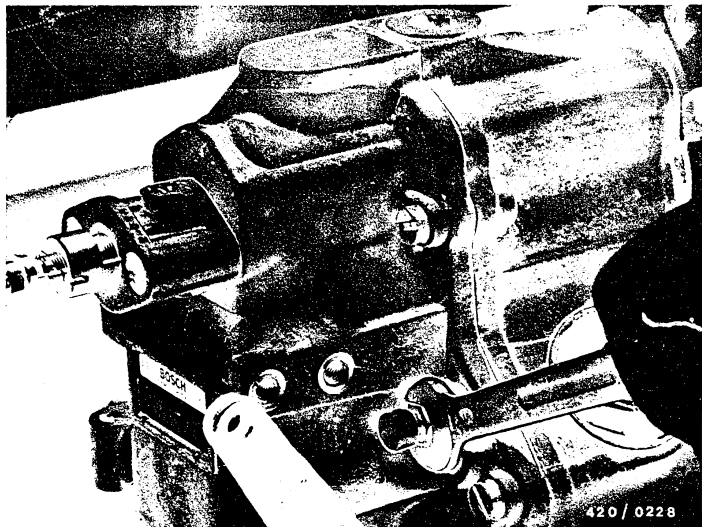


Adjustment of fuel delivery at 0 mbar charge-air pressure (naturally-aspirated delivery) for manifold-pressure compensator mounted at drive end.

Remove control-rod travel measuring device.

Loosen lock nut (1) and turn adjusting screw (2) until the specified fuel delivery is obtained. After adjustment is completed, re-tighten lock nut (1).





### 30. Setting the engine-speed limitation 2b

The control-rod travel given in the test specifications is 1 mm smaller than the full-load control-rod travel. Drive injection pump at specified speed. Move control lever in direction of maximum deflection until the specified control-rod travel is obtained. Turn maximum-speed stop screw until it touches the stop lug of the control lever and lock with lock nut.

**H1**

Setting the engine-speed limitation  
RQV governors



## 31. Setting the medium full-load speed 4

At the specified speed, bring governor control lever into the position at which the necessary control-rod travel is obtained. Measure the position of the control lever and compare with the value given in the test-specification sheet. The angle tolerance is  $\pm 4^\circ$ .

Raise speed until the second specified control-rod travel is obtained. Read off speed and compare with the speed given in the test specifications.

Insofar as the specified values are obtained, bring the stop screw into contact (if applicable). If the specifications are not obtained, change the position of the control lever within the tolerance until the required values are obtained.



### 32. Adjusting the starting fuel delivery/starting control-rod travel 6

When adjusting/checking the starting fuel delivery or starting control-rod travel, take into account whether there is any special starting equipment on the governor.

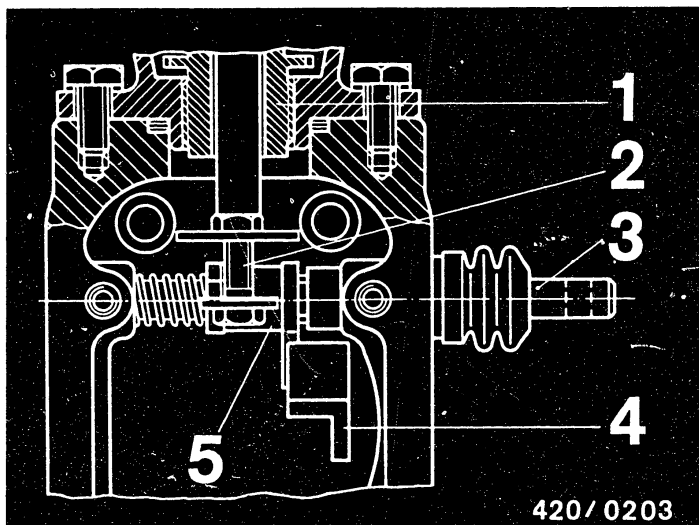
In the case of governors with a vertically mounted manifold-pressure compensator, there may be a mechanical or electromagnetic or hydraulic starting fuel delivery cancelling device.

#### Caution:

If there is any extra equipment for controlling the starting fuel delivery, check that the equipment is correctly installed:

Through mechanical, electrical or hydraulic triggering and simultaneous swivelling of the control lever from "SHUTOFF" to "MAX", the starting fuel delivery must be obtained. When the control lever is taken back, the control rod must latch in the full-load position.





420/0203

- 1 = Ratchet nut
- 2 = Stop screw
- 3 = Starting fuel delivery pushbutton

- 4 = Control rod
- 5 = Bell crank

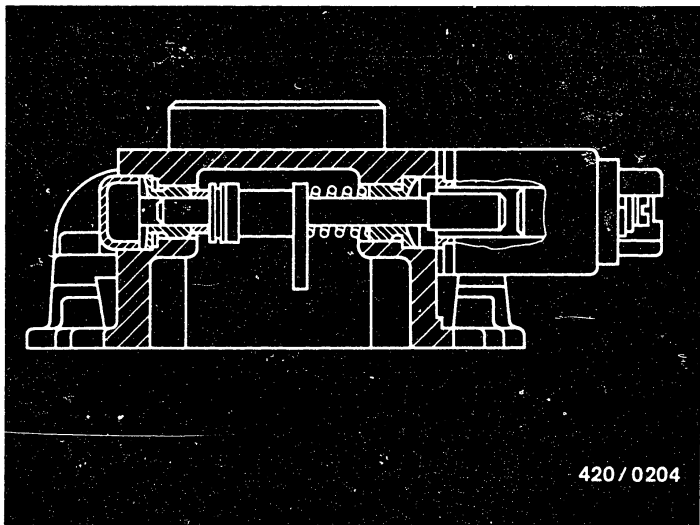
#### Starting device with pushbutton

Set the speed. Control lever from "SHUTOFF" to "MAX".  
Press pushbutton and measure delivery.

**H4**

Adjusting the starting delivery/CRT  
RQV governors





Starting fuel delivery with electromagnetic change-over

Set the speed. Control lever from "SHUTOFF" to "MAX". Briefly switch on magnet (12 or 24 V) and measure delivery.

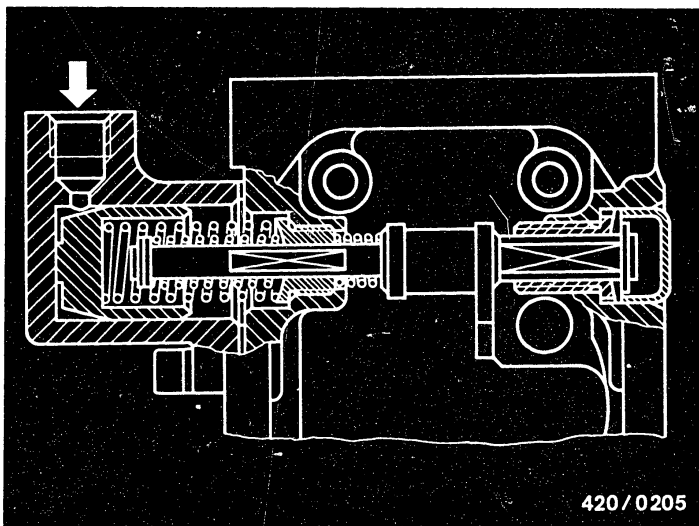
Caution:

Switch on magnet only briefly since it is only necessary to unlatch.

**H5**

Adjusting the starting delivery/CRT  
RQV governors





### Starting fuel delivery with hydraulic change-over

Leave stop on governor housing and connect port (arrow) to inlet line of test bench. Set the specified pressure at the test bench control valve:

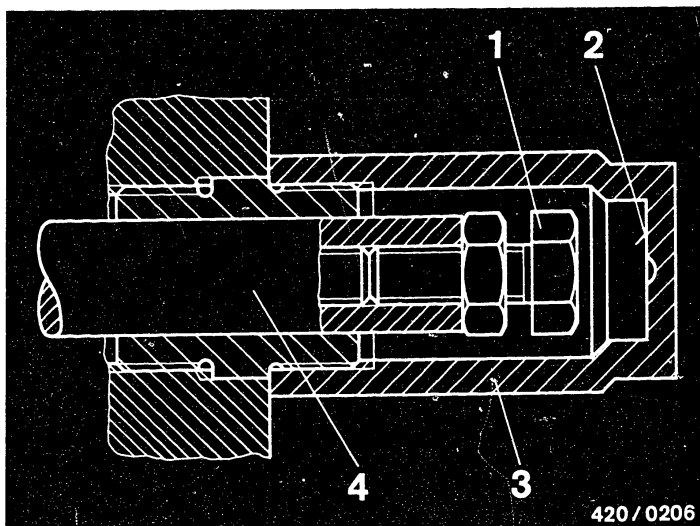
At maximum pressure and  $n = 0 \text{ min}^{-1}$ , control lever from "SHUTOFF" to "MAX". Full-load position must be obtained.

At maximum pressure and  $n = 0 \text{ min}^{-1}$ , control lever from "SHUTOFF" to "MAX". Starting position must be obtained.

**H6**

Adjusting the starting delivery/CRT  
RQV governors





1 = Adjusting screw  
2 = Stop face

3 = Closure cap  
4 = Control rod

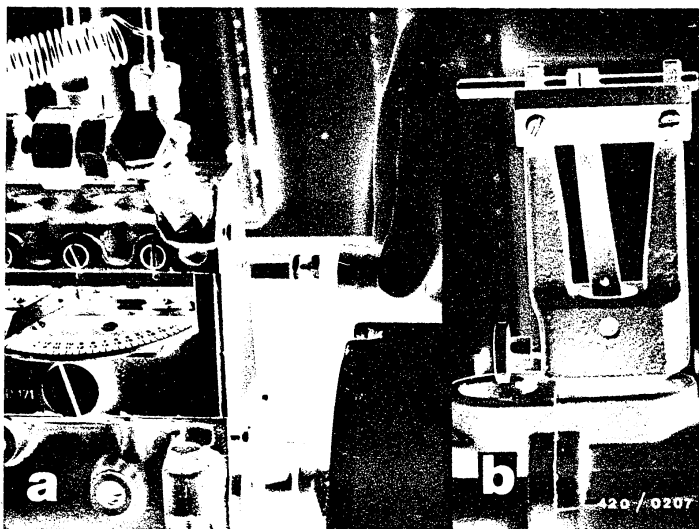
Drive injection-pump assembly at specified speed. Set control lever to full deflection. Remove control-rod travel measuring device if a control-rod stop is mounted at the drive end for adjusting the starting fuel delivery/starting control-rod travel.

The starting control-rod travel/starting fuel delivery is adjusted by appropriately screwing in the adjusting screw (1) into the control rod and screwing on the closure cap.

**H7**

Adjusting the starting delivery/CRT  
RQV governors





If only the starting control-rod travel is given in the test specifications, measuring is performed with control rod travel measuring device 0 681 440 009 (PE..A..) (picture a) or 1 688 130 079 (PE..P..) (picture b).

**H8**

Adjusting the starting delivery/CRT  
RQV governors





If a manifold-pressure compensator is mounted on the drive end, mount lateral closing covers of manifold-pressure compensator.

At the specified cranking speed, move the adjusting shaft of the manifold-pressure compensator axially until the control rod jumps into the starting position. Measure the starting fuel delivery.

**H9**

Adjusting the starting delivery/CRT  
RQV governors



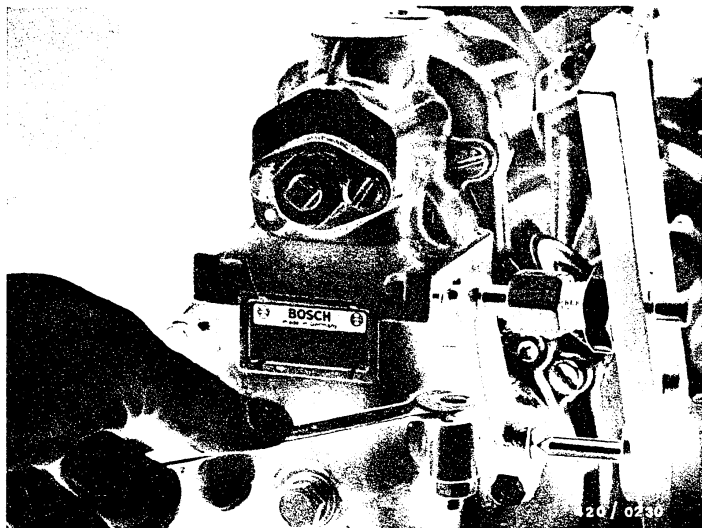
If the measurement/adjustment of the high/low idle is specified in the test specifications, the pump is driven at the specified speed and the corresponding delivery/control-rod travel is measured.

If the shutoff stop screw is used as the idle stop for the control lever, there is a corresponding note under "Remarks".

Checking the freedom of movement:

Hold control lever in idle position. Drive pump at idle speed and read off control-rod travel. When the control rod is moved by hand to "MAX" and to "SHUTOFF", it must spring back to the starting point when released ( $\pm 0.2$  mm).





### 33. Adjusting the shutoff stop

The shutoff stop screw is adjusted to 0.5 mm control-rod travel before "SHUTOFF".

Tighten lock nut.



## 34. Final operations

### Sealing

Tighten screws and lock nuts. Observe tightening torques.

Lock and seal stop screws with paint or wire. (If the method of locking the screws was identifiable when the pump was received, use the same method of locking).

Affix repair stamp and stamp on workshop code.

### Caution:

The repair stamp and the workshop code must be renewed each time the full-load delivery and/or full-load speed are (subsequently) changed.

Remove injection-pump assembly from injection-pump test bench. Mount supply pump and, if necessary, timing device.



Leak test on camshaft chamber, spring chamber and governor chamber

Compressed air is required for the leak test. Introduce into pump camshaft chamber at a suitable point (e.g. oil inspection bore).

Immerse injection pump vertically into test bath.

Test duration and test pressure:

A and MW pump: 3 min. at 1.5 bar, then  
1 min. at 0.5 bar

P pumps: 7 min. at 1.5 bar, then  
1 min. at 0.5 bar

Then visually examine whether there are any leaks at joints, screw connections, seal rings and end covers on housing and cover.

To prevent possible skin rashes, grease hands beforehand with protective skin cream and wash with soap and water after testing is completed.



# After-sales Service

## Technical Bulletin

Only for use within the Bosch organization. Not to be communicated to any third party.

### Injection-Pump Test Bench Conversion to Flywheel 1 686 609 057

40

VDT-I-400/1000 B

2.1978

In order to mount the larger flywheel 1 686 609 057 (see also VDT-W-400/305) on the drive shaft of the injection-pump test benches EFEP 375..., 410..., 385... and 390..., the suction line, discharge tubing and vacuum connections must be re-positioned. (Items 5, 6 and 7 in Figure 1)

#### 1. Removal of the connecting parts

##### 1.1 Test-oil inlet - Item 6:

Remove the hose fitting on the control valve; the fitting is accessible above the oil motor after taking off the rear wall of the test-bench housing. After unscrewing the 3 countersunk-head screws, the pipe bend together with the hose can be pulled out through the hole.

##### 1.2 Suction-line connector - Item 5:

After unscrewing the 3 countersunk-head screws, remove the pipe bend, loosen-off the hose connector and pull off the plastic hose.

##### 1.3 Vacuum connector - Item 7:

Unscrew the countersunk-head screws, loosen-off the hose connector and pull out the hose.

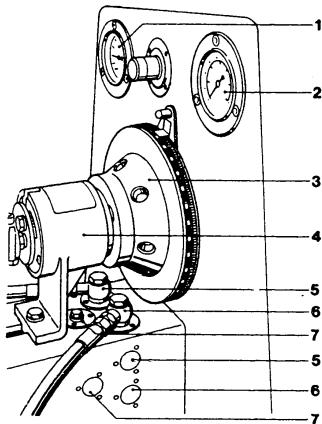


Figure 1 Front side of the upper part of the test bench

- 1 Thermometer
- 2 Pressure Gauge
- 3 Graduated disc
- 4 Backlash-free clutch
- 5 Suction-line connector
- 6 Pressure-line connector (Test-oil inlet)
- 7 Suction-line connector  
(Blank off when not used)

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**N1**

Technical Bulletin  
RQ/RQV governors



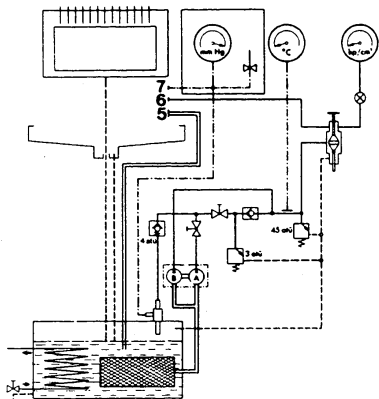


Figure 2 Line schematic

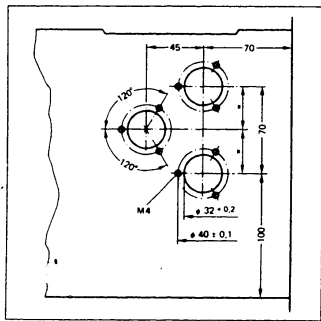


Figure 3 Drilling dimensions

## 2. Drilling the new connector openings

(Use flange as marking template)

The 32 mm dia. holes (cut using a spot facer), and the M 4 tapped holes, are to be located on the operating side of the test bench which experience has shown to be used the most. During drilling, beware of electric cables, it might even be advisable to lock the push-button switch and remove the fuses.



### 3. Modifying the pipe bends

Modify both pipe bends, for test-oil inlet and for suction-line connector, in accordance with Figure 4 so that they fit during reassembly. Shorten them as shown in Figure 4 and re-solder (brazed).

### 4. Reassembling the connecting parts

Assemble in the order given under 1, e.g. connect the hose which leads to item 6 with the pipe bend and insert it in the hole prepared; secure with the countersunk-head screws.

Items 5 and 6 in accordance with 1.

Blank off the holes on the upper side with appropriate cover plates.

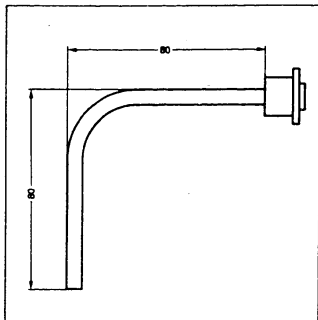


Figure 4    Modify pipe bend

### 5. Remove and replace the flywheel

The flywheel is secured to the drive shaft with hexagon-head screw, washer and keyway. After removing the multi-plate clutch, unscrew the hexagon-head screw and pull off the old flywheel.

The new flywheel is fitted in the reverse order. Check for true running (maximum deviation: 0.03 mm).



# After-sales Service

## Technical Bulletin

Only for use within the Bosch organization. Not to be communicated to any third party.

TEST SHEET FOR FUEL INJECTION PUMPS

VDT-I-Gen. 053 En

Instructions for use in  
after-sales service

10.1982

Testing and adjusting specifications in test sheets give the customer the values that specialists have stipulated for his fuel-injection assembly and they can be referred to again at a later stage if required.

Great importance is attached to the documentation of testing and adjusting specifications not only as evidence in guarantee cases, but also in individual cases of quality control.

The test sheet is an important item in the quality work of the Bosch after-sales service centers and will be introduced immediately to the after-sales service organization and is to be prescribed for use (example see over).

### Application

The test sheet for fuel-injection pumps must be drawn up for all testing and adjusting work carried out on the injection-pump test bench for commercial customers (e.g. vehicle representative organizations, authorities, forwarding agents). The test sheet may also be drawn up and handed in for private customers.

In the case of guarantee claims on injection pumps, providing these concern testing and/or adjusting values, a test sheet should be kept with the guarantee claim form in every case.

The signature of the workshop manager confirms that the vehicle to be tested was in fact tested with the test equipment prescribed by Bosch and that the relevant test regulations were adhered to.

The test sheet (1 pad = 50 duplicating sets) can be ordered in the usual manner by quoting publication no. VDT-W-400/308.

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**N4**

Technical Bulletin

RQ/RQV governors



# Test sheet for fuel-injection pumps

VDT-W-400/308-1 En



Customer \_\_\_\_\_ Order no. \_\_\_\_\_  
 Pump \_\_\_\_\_ Assembly no. \_\_\_\_\_ Tested on \_\_\_\_\_  
 Governor \_\_\_\_\_ Series no. \_\_\_\_\_ by \_\_\_\_\_

E = Measurement when received, A = Measurement when adjusted

Prestroke E \_\_\_\_\_ mm at \_\_\_\_\_ mm RT Cam sequence: \_\_\_\_\_  
 A \_\_\_\_\_ mm Angular cam spacing: E \_\_\_\_\_ °camshaft  
 A \_\_\_\_\_ °camshaft

Delivery quantity	n min <sup>-1</sup>	RT mm	LDA p bar		Delivery quantity (FM) cylinder (cm <sup>3</sup> /1000 strokes)												FM scat- tering
					1	2	3	4	5	6	7	8	9	10	11	12	
Full load				E													
				A													
Deliv- ery charac- teris- tics				E													
				A													
				E													
				A													
				E													
				A													
Idle				E													
				A													
Start				E													
				A													
Breakaway				E at	min <sup>-1</sup> mm RT less than at full load							torque-control travel		mm RT			
				A at	min <sup>-1</sup> mm RT less than at full load							torque-control travel		mm RT			
Manifold-pressure compensator (LDA)				E at	bar	mm RT	at	bar	mm RT	at	bar	mm RT	at	bar	mm RT		
				A at	bar	mm RT	at	bar	mm RT	at	bar	mm RT	at	bar	mm RT		

## Distributor-type fuel-injection pump

FM = Delivery quantity RT = Control-rod travel

Timing-device travel	E at	min <sup>-1</sup>	mm	at	min <sup>-1</sup>	mm	at	min <sup>-1</sup>	mm
	A at	min <sup>-1</sup>	mm	at	min <sup>-1</sup>	mm	at	min <sup>-1</sup>	mm
Supply-pump pressure	E at	min <sup>-1</sup>	bar	at	min <sup>-1</sup>	bar	at	min <sup>-1</sup>	bar
	A at	min <sup>-1</sup>	bar	at	min <sup>-1</sup>	bar	at	min <sup>-1</sup>	bar
Overflow quantity	E at	min <sup>-1</sup>	cm <sup>3</sup> /10s				at	min <sup>-1</sup>	cm <sup>3</sup> /10s
	A at	min <sup>-1</sup>	cm <sup>3</sup> /10s				at	min <sup>-1</sup>	cm <sup>3</sup> /10s
Breakaway	E at		min <sup>-1</sup>			cm <sup>3</sup> /1000 strokes			
	A at		min <sup>-1</sup>			cm <sup>3</sup> /1000 strokes			

Judgment/remarks:

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Date, signature of examiner

Company stamp

Signature of workshop manager

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**N5**

Technical Bulletin

RQ/RQV governors



# After-sales Service

## Technical Bulletin

Only for use within the Bosch organization. Not to be communicated to any third party.

TELEPHONE ENQUIRIES ABOUT TEST SPECIFICATIONS  
FOR INJECTION PUMPS

VDT-I-Gen. 057 En

3.1983

040 ..  
041 ..  
042 ..  
046 ..

There has recently been a considerable increase in enquiries and demands for test specifications for fuel-injection pumps and governors. The following regulation has therefore been introduced and will apply until further notice:

1. Enquiries about test specifications can be directed to KH/VSK in Wernau, Tel: 07153/63-623 (automatic telephone answering service).
2. Experience has shown that answering enquiries with the cooperation of various departments often takes several hours. Answers to enquiries can therefore be made at the earliest during the afternoon of the day in question.

This time delay must be taken into account especially when a fuel-injection pump is being timed again after repair work. It would therefore be of considerable assistance if a check could be made before each period of repair work, to see if the test specifications are in the microcards. If they are missing, they can then be ordered immediately.

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**N6**

Technical Bulletin

RQ/RQV governors



# Technical Bulletin

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## SETTING OF PORT CLOSING

VDT-I-400/113 En  
3.1984

EP-combinations 0 402 848 ..  
using the fuel-injection pumps

PESV 8 P 90/320 LS 5	Fitted in MAN engines of the
.. LS 11	model range D 2858/M1, D 2658
.. LS 11 Z	M 2, D 2658 M 20, D 2658 M 23
.. LS 13	and D 2658 M 4

Up till now, the port closing adjustment on engines with an 8-cylinder, P-type pump (2 cylinder banks in "V" form) has led to leaks and maladjustment of the delivery quantity on pump-cylinder 1. This was due to the fact that the deliveryvalve holder of pump cylinder 1 (seen looking from the pump drive, 1st cylinder on the right) had to be unscrewed and the flange bushing turned with it. This fault has been reported from workshops and from MAN operators.

If it is necessary, for any reason whatsoever, for one of the above-named pumps to be removed in your workshops or at a MAN operator, it is necessary for you to carry out the following jobs in order to ensure perfect timing of the pump to the engine:

1. Check the uniformity of fuel delivery at rated speed in accordance with the test specifications. Observe cylinder 1.

**N7**

Technical Bulletin  
RQ/RQV governors



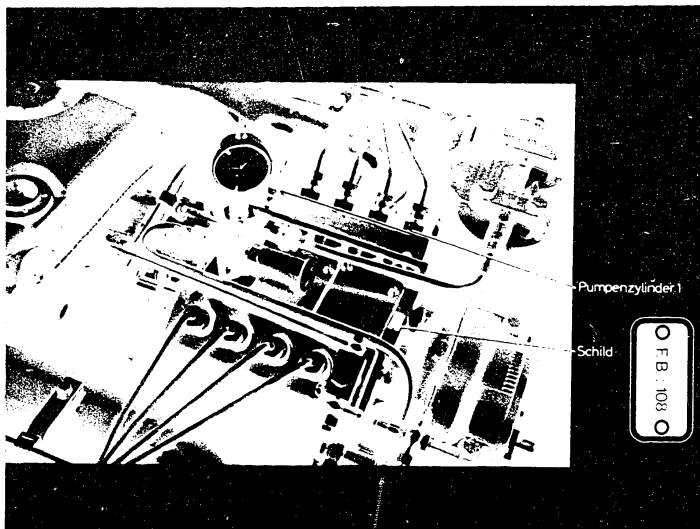
2. Connect the port-closing measuring device 1 688 130 085 - EFEP 388 A together with the appropriate dial indicator to pump cylinder 1.
3. Unscrew the upper screw plug 2 443 462 014 et the supply pump (30 mm A/F), and replace it with the modified screw plug with inner thread. This screw plug is comprised of the following parts:

2 442 462 023	Screw plug with inner thread
2 443 462 024	Plug screw for screw plug
2 916 710 607	Flat seal ring

Now screw the holder 1 688 130 044 - EFEP 466 into the internal thread of the screw plug, use a seal ring. Depending upon the particular dial indicator, it may be necessary to lengthen the measuring stem. The important thing is that the stem is long enough, with the dial indicator fitted, to reach the base circle of the supply-pump camshaft with ease i.e. it must be possible to set the dial indicator to "0" as detailed under Para. 4 (refer to Fig.).

4. Turn the camshaft in the normal direction of rotation and, when the supply-pump camshaft is in the BDC position, set the dial indicator to "0".





5. Check the plunger lift to port closing (refer to Test Specification Sheet). Here, at the position "start of delivery (FB), pump cylinder 1", the value read-off on the dial indicator mounted on the supply pump is to be stamped-in on a special plate in hundredths of a millimeter. This special plate, Part Number 1 901 102 005, is to be attached to the upper side of the pump housing (seen looking at the drive end) after the "Start of delivery (FB)" data has been stamped-in. It is to be fastened using 2 grooved drive studs (2 917 725 031), the numbers must be legible from the governor side (see Fig.).

Caution:

The pump is to be checked on the test bench as follows before the "start of delivery (FB)" data is stamped into the plate 1 901 102 005.



The work as detailed in Paras. 4 and 5 for determining the start of delivery, with the dial indicator on the supply pump, must be repeated a number of times with this pump type. The FB figure which has been determined must be reached again without any doubt in the following checks. Between each check, the pump must be run briefly at its rated speed ( $n_p = 1000 \text{ min}^{-1}$ ).

If the readings taken during these checks differ each time by more than 0.03 mm compared to the previously taken measurement, this means that the roller of the roller tappet in the pump housing must be changed. This is carried out as follows:

- Remove the fuel supply pump
- Remove the governor cover, the flyweight assembly and the governor housing.

Caution!

Pay attention to the shims for camshaft play in the governor housing.

- Unscrew the tappet-guide screw and pull out the supply-pump roller tappet 2 418 750 005.
- Remove the tab washers 2 411 290 001 (for the roller) and replace the roller 2 410 202 009.

Reassembly is to take place in the reverse order.

After changing the roller in the roller tappet, the start of delivery figure must be determined again and stamped into the plate 1 901 102 005.



If for any reason at all, the supply pump is replaced, it is imperative that the start of delivery dimension is checked again. If it has changed, the new figure is to be stamped into the plate. If the supply pump is replaced in the vehicle, this check can be carried out using the port-closing setting device KDEP K 200, or the high-pressure hand pump 1 687 222 048.

Up till now, the out-of-round of the roller tappet has not been taken into consideration and the start of delivery has not been checked and marked on the pump. This means that a possibility must now be created in order to differentiate between the various pumps. The start of delivery figures which have been stamped into the plate as a result of this Technical Bulletin must therefore be clearly and legibly underlined.

The fuel-injection pumps concerned must be checked for correct setting in accordance with the Test Specification Sheet after the above checks have been completed.

6. In those cases in which the uniformity of delivery and the pre-stroke are both OK, i.e. with new pumps, the start of delivery dimension can be ascertained using the high-pressure hand pump EFEP 453 B - 1 687 222 048, or the port-closing setting device KDEP K 200, using the familiar high-pressure overflow method.

Under no circumstances whatsoever are any of the delivery-valve holders to be loosened or unscrewed.

The start of delivery dimension ascertained in this manner will be used in future as the reference point. For this reason, utmost care must be exercised when carrying out this step. If necessary, it is to be repeated.



This work is to be carried out free-of-charge for the customer, and is completely independent of warranty regulations which may have been applicable.

The warranty reporting and the warranty procedure for reimbursement for the work carried out, and material used, is to be as follows:

Outside Germany: The RG and AV are requested to credit 1 1/2h (15 AW) on the collective warranty report for the work performed. This Technical Bulletin is to be quoted.

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# After-sales Service

## Technical Bulletin

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40...46, 58

### NOTES ON TESTING

VDT-I-420/115 En

ADJUSTING THE MANIFOLD-PRESSURE COMPENSATOR (LDA)  
ON THE FUEL INJECTION PUMP COMBINATIONS OF  
DAF-ENGINES DT 615, DF 615, DU 825

3.1984

Supersedes VDT-I-DAF 004

On the fuel-injection pump combinations as given above, the full-load deliveries are set as follows:

Remove the LDA and carry out the basic setting of the pump according to Section A, and of the governor according to Section B of the Test Specifications.

#### Fit the LDA

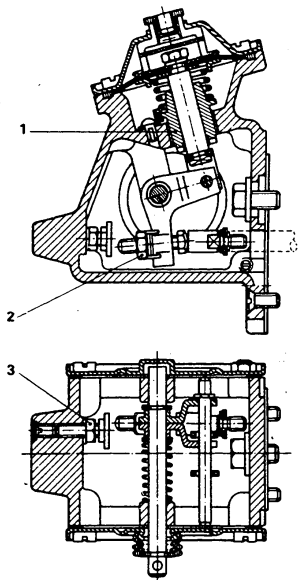
Set the full-load quantity (with charge-air pressure) using the full-load stop screw (3) in the housing of the manifold-pressure compensator.

At the speed given in the Test Specifications, set the manifold-pressure travel at the guide bushing of the helical spring (1) (spring seat).

Using the bell crank (2) of the manifold-pressure compensator, set the full-load delivery at 0 bar.

Set 0.2...0.3 mm more control-rod travel at the fuel-delivery stop screw in the governor than is the case with charge-air pressure.

- 1 = Spring pre-tension (start and end of LDA travel)
- 2 = Setting (without charge-air pressure)
- 3 = Setting (with charge-air pressure)



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**N13**

Technical Bulletin

RQ/RQV governors



# Technical Bulletin

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40...46, 58

SETTING THE FUEL DELIVERY  
ON IN-LINE INJECTION PUMPS OF SIZE P,  
MOUNTED ON SCANIA ENGINES

VDT-I-400/116 En

6.1984

To achieve increased or reduced power outputs, Scania is readjusting the full-load deliveries on in-line injection pumps of size P mounted on engines of series D 8, DS 8, D 11, DS 11, D 14, DS 14.

The pumps are marked by an additional letter after the type designation of the pump and in some cases after the assembly part number. When changed, the corresponding test specifications will refer to this Technical Bulletin.

As of a power output of 85 % and lower it is not necessary to adjust the manifold-pressure compensator. The fuel deliveries given in the tables were compiled using Saab-Scania documentation.

The reduced power outputs for engine D 11 are listed on test-specification sheet SCA 11.0 n. The test specifications for the power output versions of series D 14 and DS(C) 14 are published on individual test-specification sheets.

**N14**

Technical Bulletin

RQ/RQV governors



Engine		Pump				Governor	
D 8		PE 6 P 110A 720 RS 261				RQV...170R, EP/RSV..310 R	
Pump S 261..	Out- put %	Delivery in cm <sup>3</sup> /1000 ( $\pm 1.0$ ) at engine speed ..min <sup>-1</sup>				Change of control- rod travel for change of full load	
		1200	900	750	600		
X	95	84	81	78	72	- 0.7 mm	
Z	90	80	75	71	64	- 1.2 mm	
N	85	76	70	64	55	- 1.7 mm	
M	80	71	63	57	48	- 2.3 mm	
L	75	66	57	52	43	- 2.8 mm	
K	70	60	52	46	37	- 3.3 mm	
J	65	56	49	44	34	- 3.6 mm	
I	60	51	46	41	31	- 3.9 mm	

The test specifications apply to calibrating oil to  
ISO - 4113.



Engine		Pump				Governor	
DS 8		PE6P110A720 RS 3012				RQV .. 275 R	
		PE6P110A720 RS 3013				EP/RSV .. 310 R	
		PE6P110A720 RS 3034				RQV .. 275 R	
		PE6P110A720 RS 3035				EP/RSV .. 310 R	
Pump S ..	Out- put %	Delivery in cm <sup>3</sup> /1000 (± 1.0) at engine speed ..min				Change of control- rod travel for change of full load	
		1200	900	750	600		
T	103	121	118	118	118	+ 0.3 mm	
S	98	113	109	108	107	- 0.2 mm	
X	95	109	105	102	101	- 0.5 mm	
Q	93	106	102	99	97	- 0.7 mm	
Z	90	102	98	94	91	- 1.0 mm	
O	88	100	95	91	86	- 1.2 mm	
N	85	96	92	87	80	- 1.5 mm	
M	80	91	86	80	69	- 1.9 mm	
L	75	86	81	74	60	- 2.3 mm	
K	70	80	74	66	51	- 2.8 mm	
J	65	77	71	63	46	- 3.1 mm	
I	60	73	67	58	41	- 3.5 mm	

The test specifications apply to calibrating oil to ISO-4113.



Engine Pump		Governor				
DS 11		PE6P110A720RS3006 PE6P110A720RS3016 PE6P110A720RS3014			RQV .. 242 R EP/RSV..310 R EP/RSV..310 R	
Pump S ..	Out- put %	Delivery in cm <sup>3</sup> /1000 (± 1.0) at engine speed ..min <sup>-1</sup>				Change of control- rod travel for change of full load
		1100	900	750	600	
P	120	198	202	202	204	+ 2.1 mm
U	115	198	189	188	192	+ 1.6 mm
R	113	183	185	184	187	+ 1.4 mm
W	110	178	178	178	181	+ 1.0 mm
V	108	175	175	174	177	+ 0.8 mm
						(Case - USA)
Y	105	170	170	169	171	+ 0.5 mm
T	103	168	167	166	167	+ 0.3 mm
S	98	158	159	158	159	- 0.2 mm
X	95	152	154	153	154	- 0.4 mm
Q	93	148	151	150	150	- 0.6 mm
Z	90	143	146	146	146	- 0.8 mm
O	88	139	142	142	142	- 1.0 mm
N	85	133	134	136	135	- 1.3 mm
M	80	124	125	127	126	- 1.7 mm
L	75	116	115	117	114	- 2.1 mm
K	70	108	106	105	102	- 2.5 mm
J	65	101	97	96	92	- 2.9 mm
I	60	94	90	88	85	- 3.4 mm

The test specifications apply to calibrating oil to ISO-4113.



Engine Pump						Governor
DS 11		PE 6 P 100 A 720 RS 202 PE 6 P 100 A 720 RS 203				RQV..167R, 168 R EP/RSV..310 R
Pump S ..	Out- put %	Delivery in cm <sup>3</sup> /1000 (± 1.0) at engine speed ..min <sup>-1</sup>				Change of control- rod travel for change of full load
		1100	900	750	600	
W *	110	176	179	181	182	+ 0.9 mm
V *	108	172	174	176	176	+ 0.7 mm
Y *	105	168	170	172	171	+ 0.5 mm
T	103	165	166	168	164	+ 0.3 mm
S	98	156	157	157	152	- 0.2 mm
X	95	151	152	152	147	- 0.5 mm
Q	93	147	148	148	143	- 0.7 mm
Z	90	142	143	142	137	- 1.0 mm
O	88	138	139	137	133	- 1.2 mm
N	85	133	135	132	127	- 1.6 mm
M	80	124	125	122	116	- 2.1 mm
L	75	114	115	111	104	- 2.7 mm
K	70	104	105	100	93	- 3.2 mm
J	65	97	96	90	83	- 3.7 mm
I	60	89	86	80	73	- 4.3 mm

\* Start of delivery on these versions with prestroke  
= 2.4 .. 2.5 mm as of BDC

The test specifications apply to calibrating oil to  
ISO-4113.



Note:

Setting of the injection-pump assemblies is permissible only in accordance with the pump designation and/or marking.

Use only the latest, valid test specifications on microfiche WP.. . Other injected fuel quantities may lead to engine damage and therefore to claims for damages from owners of engines and vehicles.

When replacements are ordered for complete injection-pump assemblies, we deliver only the assembly with the basic setting. This means that, when replacing a marked injection pump, you must perform the appropriate fuel-delivery setting and marking.

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Division KH

After-Sales Service Department for Training and Technology (KH/VSK)

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